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SEPTEMBER 1, 1995

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FROM THE

EDITORS

DON'T BLOW IT NOW

As the telecom reform package heads into a conference committee, which will iron out differences in the House and Senate versions of the bill, it will be important for lobbyists frothing from different sides of the network pastry cart to keep their appetites under control. A refusal by the local and interexchange carriers to bargain in good faith at this stage could doom the bill, which already is under a veto threat.

The conference negotiations represent the closest the communications industry has come to a more rational economic policy in years. The price of failure to pass the bill now will be to retard innovation in the local loop for at least another two years—an eternity given the rate at which the public network landscape is changing.

And frankly, none of the public network players at the table should be approaching this bill with the attitude that they have two years to spare. In fact, for those with a romantic view toward maintaining a near monopoly in the public telecom services market, it's already too late.

Who's to say which companies will be public network players in two or more years? The rise of commercial on-line services over the past two years has been almost bewildering. At the current rate of demand, innovation and growth, who would deny that America Online will take a seat at the public network banquet? What about the amazing growth curves of Performance Systems International and UUNet Technologies, two of the largest global commercial internetwork providers? They are already looking like deadly serious public network players.

So before the big network players uncage the lawyers in the next round of telecom reform talks, they should remember they don't really have any choice but to work out a deal. It seems to me the real adversary is the President, who would micromanage the changes ahead. But too much bickering among network segment providers could kill the deal too. And that would not be wise.

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Robert Rosenberg
President, Insight Research

COMPETITIVE MARKET CALLS FOR NEW TELCO BUSINESS MODEL

Cost of Attrition

Telephone companies have been weakened by loss of morale and productivity. Following massive layoffs, employees who remain are expected to work harder in a less stable environment. Management must address this issue if the phone companies are to prosper in the new communications industry.

If all our modes of communication—voice, print, graphics, music and videos—are converging on a digital substrate, our networks and the business models we use to construct them must change as well.

Since the telephone monopoly was established in the 1930s, it operated on two key assumptions: first, price competition would be rare and overall competition unexpected; and second, if carriers were to compete against new market entrants, they would compete through litigation and lobbying rather than service improvements.

These assumptions, which sprang from Theodore Vail's concept of natural monopoly, are deadlier than a doornail. A demand-driven model is emerging to replace a supply-side view of common carrier service.

For example, in a recent study, Insight modeled the 1994 and 1995 deployment of a fast packet switching service in terms of carriers' installation plans and equipment costs.

After 1996, we assumed installations would continue only if the service proved valuable to corporate customers. Beyond 1996, revenue associated with a particular service will depend on how well services meet customers' needs compared to other options. Market demand and the introduction of alternative services will be critical in shaping the rate of growth, not the latest announcement of service availability from a leading carrier.

If this sounds like a truism straight out of Marketing 101, the move from a protected telephone industry to a competitive communications industry has been a gut-wrenching turnabout for the Bells. As the new business model takes hold, it is forcing painful reductions in telco operating expenses. Since late 1992, the RBOCs have laid off more than 130,000 employees and written off billions of dollars in older equipment that had not been fully depreciated.

The most visible effects of these layoffs are severance payments and the loss of skilled personnel. But the greatest deficit shows up in loss of morale and productivity. Remaining employees are expected to work harder in a less stable environment. Management must address this issue if the phone companies are to prosper in the new communications industry.

As the Bells join a wider communications industry, they will confront competitors with new network technologies, different ideas about content and different payment models. Taken as a group, the LECs provide the most reliable switching and customer billing systems, but with end-user charges typically running more than 3.5 cents per minute and actual costs less than 1 cent per minute, there is significant room for competitors to provide lower-priced services.

The future of the phone companies will be shaped by three factors:

- Competitors entering their core residential and commercial businesses;
- Capital-intensive new opportunities such as wireless communications and interactive entertainment services; and
- The recent mediocre financial performance of some RBOCs, which has limited their financial resources for new ventures.

If a new Communications Act emerges from Congress, it seems prudent to assume that by 1997 or 1998 consumers in many big cities will be able to choose from several local exchange carriers, just as they do for long distance service. Three major competitors are well positioned to grab share in the RBOCs' home markets:

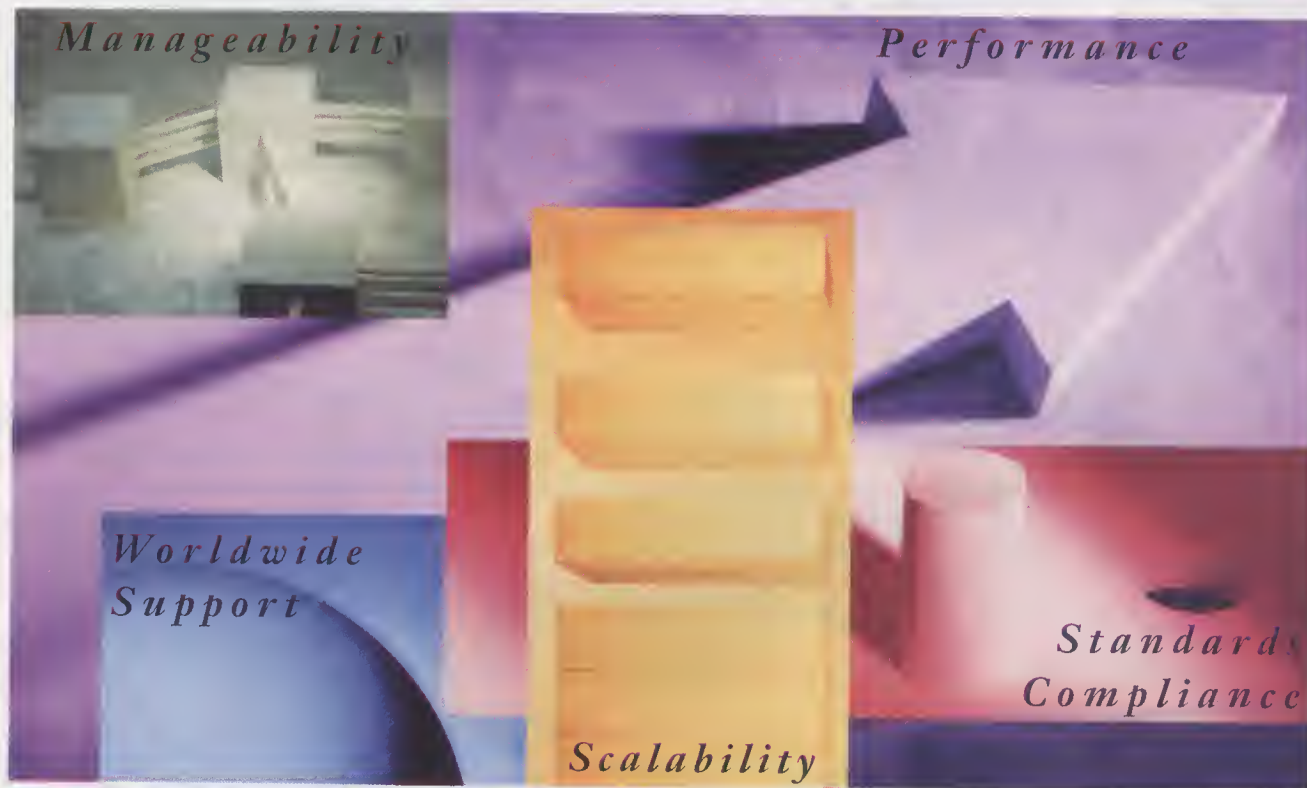
- Alternative access carriers like Teleport Communications Group and MFS have captured major portions of the large corporate market, where high prices subsidized consumer services.
- Cable TV companies (some backed by Sprint) have begun integrating entertainment and telephone functions into one interactive network based on CATV technology.
- Expansion-minded RBOCs, primarily Bell Atlantic and US West, have begun creating service alliances and investment partnerships to expand beyond their traditional geographic regions.

For a telephone company to survive and thrive in the years ahead, a new business model must be embraced across the organization. Some telephone companies will adopt a defensive posture, challenging change and new, seemingly unfair competitors. The ones that will succeed will adopt an aggressive approach seeking major alliances and trading traditional privileges, which they probably will lose anyway, for the right to freely enter new rapidly growing markets. ■

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TO PROTECT OUTSIDE EQUIPMENT, BRING THE ISSUE TO (EN)CLOSURE

Mark Dziaikiewicz, Technology Editor

We say it's happening, but evidence of convergence often is hard to come by. Industry terms are a good example. Will headends ever become central offices? Maybe. But when it comes to enclosures, convergence is just two letters away.

On the CATV side, it's "enclosure"; on the telco side it's "closure," but both refer to the same item: equipment housing types such as pedestals or junction boxes. A simple "en" stands in the way of industry convergence.

"The dictionary definition of the product we're talking about is an enclosure," contends George Sell, market research and product development guru at Channel Commercial. "But you'll find the word closure used a lot in Bellcore specifications." The missing "en" stems from military tendencies to drop or shorten words. "There's always been a close association between the military and telephone industry," he says.

Terminology aside, functionality is industry blind. "It's where the underground cable has to come up out of the ground and some sort of device is required to do something—either top it off, split it or amplify," explains Sell. "Some additional equipment has to be introduced into the network and it has to be done above ground and it has to be accessible."

Several products fit the enclosure definition including pedestals, junction boxes, terminal boxes and controlled environment vaults (*Technology 101*, April 15, 1994). Pedestals are above-ground enclosures, CEVs below ground, and "boxes" can be flush to grade, above ground, wall or pole mounted. Though you'll never see the word "terminal" in CATV nomenclature, according to Sell, every enclosure serves a similar purpose. "The enclosure has to play a role in optimizing the functionality of the equipment it's housing."

Optimization comes in three flavors: protection from the environment, heat dissipation and security. All three are critical outside plant (another telco term) considerations, equally important and somewhat interrelated.

Environmental issues are obvious. Whether it's the Southwest's blistering sun, arctic Northern winters or flood and pestilence anywhere, enclosures take a beating. "It's providing the outside skin protecting from heat or other damage to the equipment," he continues.

Enclosures such as pedestals and boxes began as metal housings. "The enclosure had to protect the equipment, so metals made sense," he explains. "But it wasn't until forms of plastic became more sophisticated that it became a viable alternative."

DRAWBACKS

Metal enclosures' drawbacks include corrosion due to damage. "If a metal enclosure is hit by a vehicle and sustains damage, it will likely be left in the field to rust and corrode, and perhaps the equipment inside has been damaged," says Sell. "With a metal box, you can live with the dents, but you may find the life expectancy of the equipment inside has been significantly reduced."

Plastics, on the other hand, bend or shatter, eliminating environmental protection. "With plastics, it would have been replaced and you wouldn't have an outage with the equipment failing in five years."

Plastic enclosures provide better heat dissipation, a design criterion affecting component reliability. "Metals tend to retain heat more than plastics," he offers. "On a good hot day, you could not only fry an egg [on metal], but the equipment inside is probably operating at temperatures exceeding the temperature range specified by the manufacturer."

Enclosures accomplish heat dissipation with vents and louvers for improved air circulation. Many incorporate an "attic" principle, combining insulation and air space to vent sun-loading effects. "It contains the heat coming from the sun and vents it out before the air mixes with the majority of the air in the housing," explains Sell. "There's a greater degree of heat dissipation than without it."

Free-breathing enclosures often must share equipment space with weeds, vines, rodents, mice and other pests, but security from more intelligent life forms takes precedence. "In the case of security, it's not only a case of preventing equipment from being stolen, it's a question of vandalism or theft of service," he says. "You can tap off a free drop line into your home without paying, so units have to be secure, and there can be a variety of locking systems."

Surviving a few intruder whacks may have been sufficient in the past, but as carriers move towards more sophisticated broadband equipment and networks, enclosure design, accessibility and security will play larger roles. With or without the "en," enclosures provide a stable environment for industry convergence. ■

Enclosed Please Find...

It's where the underground cable has to come up and some sort of device is required to do something—either top it off, split it or amplify. Some additional equipment has to be introduced into the network and it has to be done above ground and it has to be accessible.

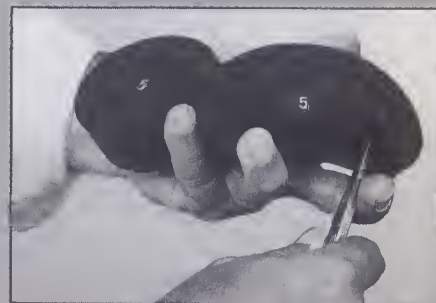
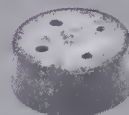
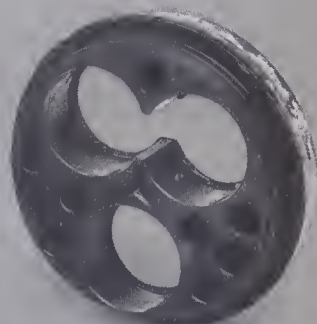
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MOTOROLA CARRIES A TORCH FOR THE IRISH

Kellye Kratch
Assistant Editor

Irish athletes training for the 1996 Olympics will have to shade their smiling eyes from the bright Florida sunshine.

With more Olympic medals per capita than any other country, Ireland never has sent its athletes out of the country to train.

But next spring, more than 70 Irish athletes representing 11 sports will arrive in Broward County, Fla., to prepare for the Centennial Olympic Games in Atlanta.

Motorola's Paging Products Group will serve as host sponsor, picking up the tab for the team's lodging, food and travel expenses.

With a Dublin, Ireland, facility that employs more than 1500 people and a South Florida facility that employs more than 6000, sponsoring the Irish training visit is a "natural tie-in," says Motorola's Ini Tomeu.

"It's almost a year away, so we don't have anything specific planned yet," she says. "But we'll probably have some luncheons and receptions."

Duties of host sponsors don't include providing pots of wireless gold. So Irish athletes won't necessarily be chatting with each other via cellular phones and two-way radios. But Olympics officials probably will. Motorola also is the official wireless communications sponsor of the 1996 games.

PENNY PINCHING

Six hundred million pennies saved are \$600 million pennies earned. At least that seems to be BellSouth Mobility's philosophy toward cutting costs.

Employee suggestions during 1994 saved the company an estimated \$6 million, nickle and diming the carrier toward profitability. Implemented ideas included:

- A new supplier for copy paper that offered the same product for 84 cents less per box and free delivery. Estimated savings per year: \$6000.
- Re-programmed thermostats to turn climate control systems off late evening through early morning. Estimated savings per year: \$583.

Hey, every penny counts. ■



PIGS ARE FLYING IN CYBERSPACE

Ever wondered about the origin of the saying "living high on the hog?" If so, you can ease your mind by visiting <http://www.nppc.org/>—the National Pork Producers Council's new Web site. Content includes "the wide range of life-saving products we get from the hog," as well as "some great new Pork. The Other White Meat recipes." No word on whether chicken producers intend to retaliate.

WANTED: UNSOLVED MYSTERY LOVERS

No need to visit the post office to check out the latest "Wanted" posters. Just log on to the Net where you can obtain information and photographs on wanted fugitives, missing persons and lost love cases. The Web site (<http://www.unsigned.com>) appears courtesy of NBC's unaccountably popular long-running series "Unsolved Mysteries." As an added incentive, the site also includes a photograph and biography of host Robert Stack. What more could you want?



IT'S ABOUT TIME

Either the apocalypse is upon us or competition finally is having an effect. Telephone companies are starting to behave logically—at least when it comes to service provisioning.

GTE has instituted Express Dialtone, which allows new residential customers to plug in their telephone, dial 4-8-3 and establish or confirm service. A "hot" line is "left there at the dwelling," says company spokesperson Mike Murray, which means residents have dialtone from the get-go, not days after the moving van pulls away.

This would seem the biggest no-brainer in telecom history, but Murray says it was a matter of technology being in place at the central offices.

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Circle 111

COUNTRY'S HAVE-NOTS WON'T SURF NET ON UNCLE SAM'S DOLLAR

Deborah Eby
Washington Editor

The U.S. government can identify the nation's technology have-nots with more precision than ever. But the billions of dollars needed to plug them in to cyberspace won't come out of Uncle Sam's pocket, admits the Clinton administration's telecom policy chief.

"We now know what the problems are, we now know who the people with significant needs are, but we haven't resolved the problem," says Larry Irving, chief of the National Telecommunications and Infor-

enthusiastic users of on-line services that facilitate economic uplift and empowerment" (see figure). Low-income, minority, young and less-educated households that receive access to on-line services likely will search classified ads for jobs, take courses and access government reports, the survey reveals.

Despite the on-line link to economic opportunity, Washington can't afford to wire have-nots, cautions Irving. "The money's just not there."

Pending telecom legislation may broaden the definition of universal service, but reforms won't be a panacea. "Even if the

upon universal service funds if necessary. But the House version (H.R. 1555) contains no such provision, and the directive faces an uphill fight from those who see it as one more burdensome federal mandate.

"Congress should craft policies in this field that fit the new thinking on entitlement reform on Capitol Hill," declares Heritage Foundation fellow Adam Thierer. But if the government can't bankroll an Info Highway on-ramp to each doorstep, Irving is determined to lead the way in "demonstrating the power of these tools if people make the investment."

NTIA's Telecommunications and Information Infrastructure Assistance Program (TIIAP), currently funded at \$49 million, will continue to provide models for reaching have-nots, especially through community access centers, he says.

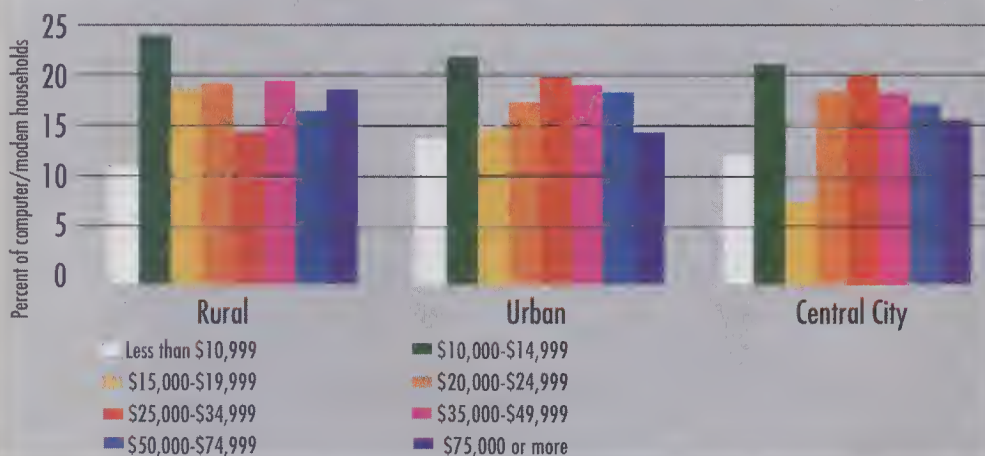
Irving points to a 1994 TIIAP project, "Charlotte's Web," as a prime example of pooling public and private funds to expand on-line access. Local governments in Charlotte and Mecklenburg Counties, N.C., teamed with universities, Southwestern Bell, Time Warner Cable and Vision Cable to provide public access terminals and computer training

in libraries, classrooms, neighborhood and senior centers, homeless shelters and health care facilities.

"We're trying to have people think creatively about where people in their community will go to access this technology," Irving says.

"We're trying to really get the public dialogue going as to how people can pay for this as opposed to any assumption that the federal government is going to pay for it," he concludes. ■

DIGITAL DEMOGRAPHICS



mation Administration (NTIA).

A recent NTIA survey pinpoints telephone, computer and modem access. Data shows modem access is lowest among the poorest and least educated, the youngest and oldest, minority groups and those in Northeastern and Southern central cities and the rural South.

The survey also found, however, that "many of the groups that are most disadvantaged in terms of absolute computer and modem penetration are the most

Universal Service Fund is revamped to include contributions from all common carriers, even if you get a fully-competitive marketplace and prices do come down, it will be a multi-billion-dollar per annum enterprise," Irving notes, citing \$30 billion as a conservative estimate for wiring schools for Internet access.

The Senate telecom bill (S. 652) would require local carriers to provide on-line access to schools, libraries and health care providers at incremental cost, drawing



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DESKTOP VIDEO HITS ITS STRIDE

Vince Vittore
Associate Editor

Less than a year ago, this column predicted high-quality video wouldn't hit the desktop for several years (Feb. 15).

What a difference a few months make.

Within the last half-year, the industry has seen a minor explosion in the number of desktop video products. And with new standards, more bandwidth to customers and increased desktop processing power, the next six months could see even more activity.

Widespread deployment of desktop video now seems inevitable. But the million-dollar question is when. Answers range from two to 15 years.

With the H.320 standard being implemented in most new desktop products, vendors have solved one of their biggest problems—interoperability.

"What's important to [most customers] is interoperability," says Steve Richardson, group marketing manager for Sun Microsystems.

H.320's companions—H.321, H.322 and H.323—should give users even more freedom by dealing with desktop video via ATM, Ethernet LANs and 803.2 LANs respectively. And the T.120 standard could be the granddaddy of them all.

"The people who are into this are even more excited about T.120," says Steve Richardson (same name, different guy), vice president-marketing with Compression Labs Inc. (CLI), which will partner with several firms to develop desktop systems.

T.120 enables the collaborative computing that could justify desktop video investment, and several companies already have incorporated the standard into their plans.

One of the first to do so, Imagelink, has discovered some users consider the ability to work on the same document simultaneously more important than the video. Imagelink's system promises as many as 30 frames per second to the desktop and a shared whiteboard. Imagelink CEO Paul Cummings says

during tests, engineers often use the video only to make contact and exchange initial greetings. "They'll shut down the video and work only on the whiteboard."

CARRIERS TAKE ACTION

Such potential has not escaped carriers' attention. In fact, many already are entering the market.

Video Server, which has a series of products for network operators, already counts five of seven RBOCs and GTE among its customers. "They're offering much more than just pipes. They're providing a fairly rich array of conferencing services," says Bob Castle, CEO of Video Server.



GROUP DISCUSSION - With multipoint conferencing, users bring several participants into the same session.

With T.120, some carriers even contemplate services such as "audio graphics" that would let users collaborate on documents and talk with (but not see) one another.

AT&T may be a prime candidate to offer such services initially. However, the company isn't shying away from video, signing an agreement with Apple, IBM, Intel and Sun Microsystems to become part of the WorldWorx network, which will provide interoperability between different vendors' systems. Additionally, the company's Global Information Solutions (GIS) division has developed its own software, Vistium, which offers multipoint video and data collaboration capabilities. More likely, though, AT&T will concentrate on providing network services, says a

spokesperson. "Not to put down Vistium, but we are primarily a transport network for desktop collaborators."

There are naysayers, of course. CLI's Richardson says widespread desktop video deployment remains years farther down the road than most people think. In his view, two factors must be addressed: getting bandwidth to the desktop without forcing telecom managers to bring in another network, and getting endpoints below \$500.

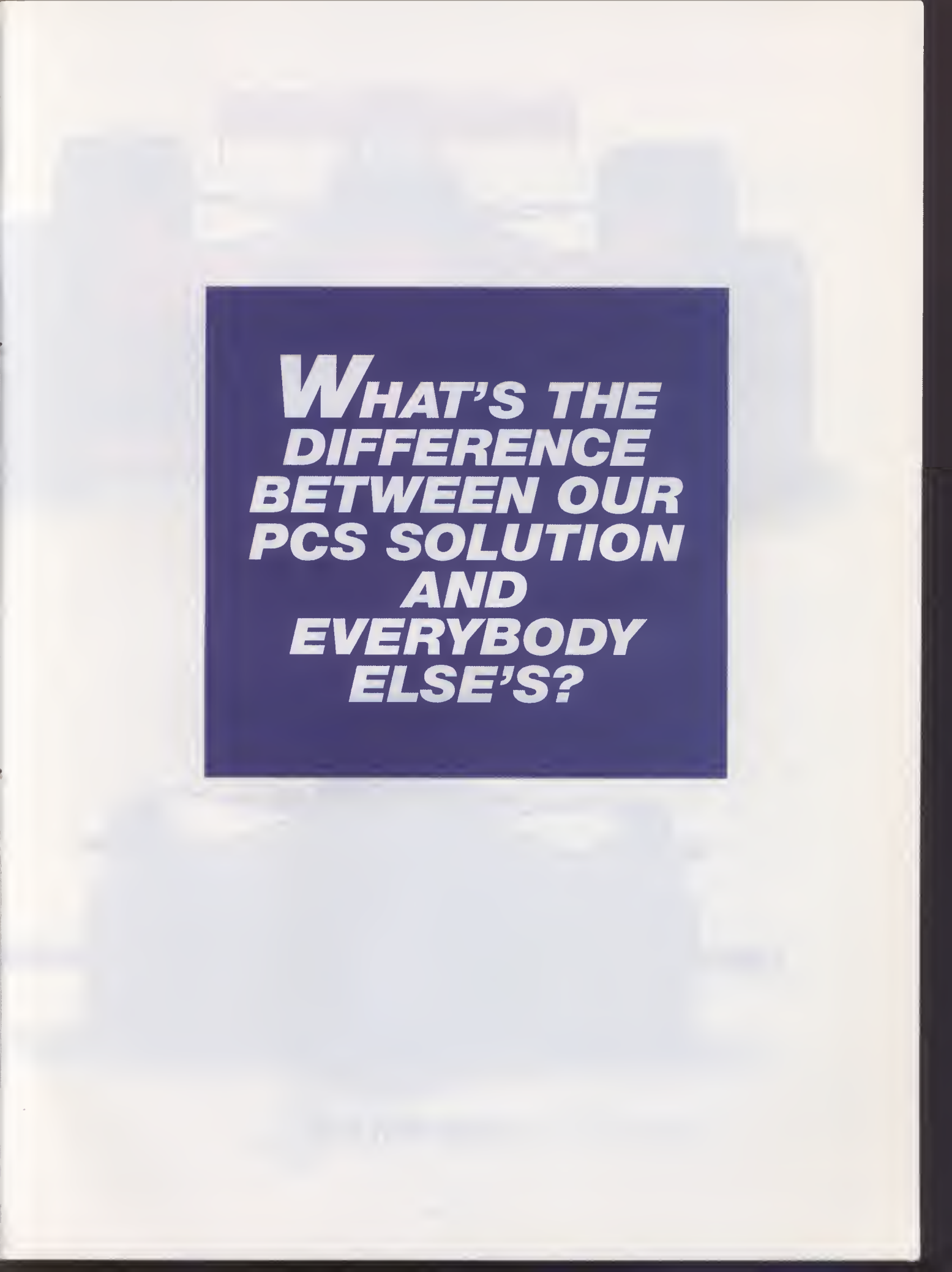
"I think there's a lot more smoke than fire," he says. "I don't think people see enormous value in video telephony to justify it. It's going to take those types of things to get it going. They've come a long way, but they have a ways to go."

For telcos, bandwidth will become less relevant as ISDN is deployed to support Internet access, says Sun's Richardson. "In 1992 when we started, we thought video would drive ISDN access. However, Internet access has done it more. So the infrastructure is going to diminish as an issue as the Internet market develops."

ATM also will help, letting users purchase bandwidth as needed. On the customer premises, ATM's already having an effect, says Imagelink's Cummings. He cites an installation at Cheyenne Software that gave as many as 350 users video and collaboration power, partly driven by ATM. "They want to take advantage of this hugely expensive ATM network they built."

However, such power users are the exception. Most think large-scale deployments will follow curves similar to e-mail or fax, which were available for several years before catching on in the mass market.

"The application, for it to be valuable, has to be able to reach many different customers who are all hooked up to very different networks," concludes Castle. "You're going to see a progression and cross some point in time and say one year was a watershed. It took 15 years for e-mail to really catch on. We're probably looking at conferencing in the same time frame." ■



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■ WIRELESS DATA

CDPD: THE REAL THING

Recent deployment ramp-up and interconnection announcements signal carriers' commitment to cellular digital packet data.

Patty Wetli
Associate Editor

Most kids may just be heading back to class, but CDPD (cellular digital packet data) technology went to summer school this year and brought home an "A" for effort.

In recently issued report cards, the CDPD Forum has noted rapid advancement in carrier deployment not only of

CDPD capability but of actual service availability. From February to July, carriers more than doubled the number of major markets now CDPD-ready, jumping from 19 to 42 in that brief period.

This latest burst in activity is "proof that the demand is coming on line," says Bret Kelsey, director-business development at the CDPD Forum. "It's just been a matter of time."

But time hasn't always been on

CDPD's side. Considering early promises made regarding technology and service deployment, carriers' recent announcements of service availability couldn't come fast enough.

PROMISES, PROMISES

"These folks have been promising that for quite some time," Kelsey admits. "They're having to live that down. Everyone has learned their lesson in speaking about large numbers."

"Everybody was just so excited," says Bell Atlantic Nynex Mobile spokesperson Karen Ann Kurlander. "A lot of unreal expectations were set initially. Remember, we're looking at a standard that's only a couple of years old. This is still a brand-new technology."

GTE's Jay Sheth agrees. "To an extent, I would say carriers caused expectations that were fairly unrealistic. Once they weren't met, [CDPD] became 'very late' and doubts came into play," says the Independent's director-wireless data.

"There was a lot of wishful thinking," adds Derek Podobas, Ameritech's director-business and technology development. "Because it was needed so badly, people couldn't wait to get it."

But that's water under the bridge. Carriers are tired of playing "could've, would've, should've," focusing instead on future deployment plans, and "momentum" seems to be the buzzword on everyone's lips.

"Carriers are definitely pushing," Kurlander notes. "We have commercial CDPD service in almost all major areas." Though Bell Atlantic may have been more forward thinking than Nynex, "as one company, we are aggressive everywhere." She promises service will be up and running in Boston and New York by yearend

continued on page 20



TESTBED - Bell Atlantic Nynex Mobile's facilities in Bedminster, N.J., include a "wireless greenhouse." According to spokesperson Karen Ann Kurlander, this lab environment gives software and hardware manufacturers access to a working CDPD network and an opportunity to test equipment and applications before deployment.

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- 55 ☐ Independent Cable TV System
- 60 ☐ Cable TV Contractor/Engineering Firm
- 65 ☐ Other Cable
- Wireless Operators**
- 190 ☐ Cellular Operator
- 195 ☐ PCS/PCN Operator
- 205 ☐ Other Wireless
- 180 ☐ Long-distance/Interchange Carrier
- 185 ☐ Competitive Access Provider (CAP)
- 220 ☐ Telecommunications Reseller
- 170 ☐ Other Carrier
- 120 ☐ TELECOMMUNICATIONS CONSULTANT
- 135 ☐ CONSTRUCTION CONTRACTOR
- 140 ☐ CONSULTING ENGINEERING FIRM
- 150 ☐ MANUFACTURER OR DISTRIBUTOR OF TELECOMMUNICATIONS EQUIPMENT
- 400 ☐ OTHER

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- 13 ☐ **Management** (VP, General Manager, System Manager, Manager, Director)
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- 16 ☐ **Sales/Marketing** (Sales or Marketing VP, Director, Manager, Representative)
- 7 ☐ **Other** (Company copies and Other Titled and Non-titled personnel)

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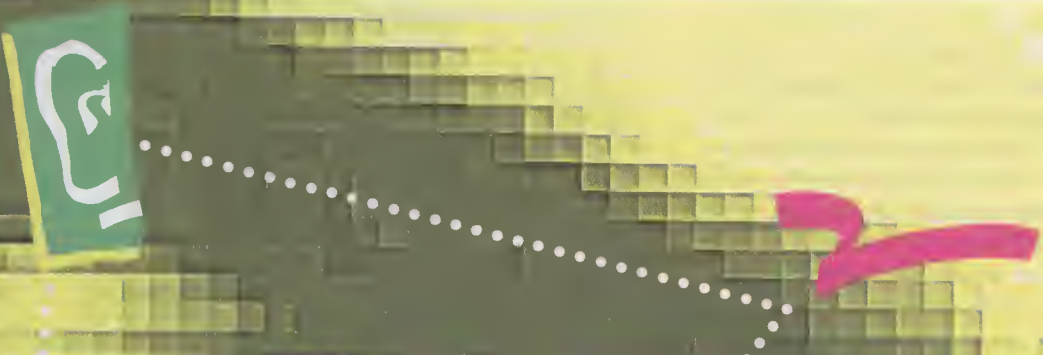
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continued on page 20



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Circle 119

CDPD

continued from page 18

and adds, "We are looking to have this mirror our voice coverage."

GTE's Sheth says his company aims to have a "very large footprint by the end of the year." And that includes moving outside GTE territory. The telco recently announced an interoperability arrangement with Ameritech whereby customers will be able to roam between the two carriers' coverage areas and maintain service.

NATIONAL OR REGIONAL

This agreement signals that CDPD's holy grail—national coverage—may be within reach. Kurlander lauds the Ameritech/GTE deal, calling it a "harbinger of good things to come."

"This will be a year of building cycle," she predicts. Next year, the focus will be on interconnection. In the meantime, Bell Atlantic Nynex Mobile is "not just biding our time" waiting for nationwide coverage.

There are plenty of vertical markets to exploit while pursuing interconnection. Police officers in Groton, Conn., don't

care if they can't take their cruisers to Chicago, she notes.

And despite throwing in its lot with GTE, Ameritech subscribes to Kurlander's philosophy. "Putting together a national network is always a priority," vows Podobas, "but a lot of companies don't

PUTTING TOGETHER A NATIONAL NETWORK IS ALWAYS A PRIORITY, BUT A LOT OF COMPANIES DON'T REQUIRE NATIONAL COVERAGE, AND WE'RE PREPARED TO SERVE LOCAL CUSTOMERS NOW.

require national coverage, and we're prepared to serve local customers now."

But are customers prepared to buy? "It's a challenge for everyone and a long sale cycle," admits the CDPD Forum's Kelsey. "I believe there's a comfort level in what people are already doing. The challenge is to get them out of the comfort zone" and view CDPD as another viable technology.

The Forum is ready to do its part, how-

ever. "The organization was concentrated on settling in the specification," he says. "Now we're in more of a marketing cycle."

Sheth points to a number of factors that must be addressed before CDPD really takes off. First up: coverage is king.

Second, expensive modems have served as something of a deterrent, but he notes they are coming down in price.

But the final factor may be more difficult to conquer.

Sheth contrasts wire-

less data with voice communication. The latter is a basic application employing the mouth and ears. Wireless data, on the other hand, is less intuitive. It must be "tied to some other application" that has to be "modified to work in a wireless environment," he says. "That adds a degree of adaptability."

Ameritech's Podobas notes wireless data in general requires an "awful lot of education." His company is taking a two-

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Circle 121



SUCCESS STORIES - Bret Kelsey of the CDPD Forum says carriers need fresh examples. "Certainly everyone's heard about Groton [police officers, pictured at left] ad nauseum."

He does, however, believe it has application beyond current niche markets, which he terms business vertical. "The ultimate prize is the consumer market," he says. "The business

pronged approach, "lecturing" on wireless data first and CDPD second. In fact, Ameritech views CDPD simply as one product in a portfolio of wireless services. "We never promoted it as a be-all, end-all," Podobas notes.

vertical is somewhat limited": there are only so many police officers, so many transport companies. "You can't create more of them."

It's up to carriers to identify new markets and services, to look beyond the obvi-

ous. But Kurlander notes, "The customer wants to see someone else do it first."

Yet Sheth remains optimistic. "Absolutely we see this developing to the mass market." Both he and Podobas believe voice and data eventually will be integrated into one device. More advanced forms of two-way messaging would be possible, but subscribers could "free form" responses rather than be limited to pre-determined answers, according to Sheth.

All of which sounds pretty ambitious for a service still experiencing its first growth spurt. But those CDPD folks are used to life on the edge. "Does it make me nervous? It always makes us nervous whenever we spend millions of dollars," says Sheth. "On a daily basis, it makes me nervous."

Still, he remains convinced of the overall potential of wireless data. "I look at macro indicators," he says, such as the increasing number of people signing up for on-line services. "We are an information intensive society." Combine that fact with CDPD's mobility component, and Sheth believes carriers are backing a winner. ■

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Circle 136

WAS BLILEY BULLIED?

IXCs will try to roll back last-minute changes when legislation goes to conference committee.

Deborah Eby
Washington Editor

Despite the RBOCs' strong House victory on telecom reform, their IXC rivals promise a furious struggle when a conference committee meets to finalize legislation later this month.

IXCs are "working like dogs" to drive home the message that deregulation without adequate protections will kill competition.

"What we have been arguing is that there needs to be a little more regulation for a little longer" until the local market is more ripe for competition, says Ernest B. Kelly III, executive director of the Telecommunications Resellers Association.

"The bill that passed committee in the House was a good bill," Kelly continues. "But it was overturned by the House leadership, and their changes were passed. The intent of certain sections were entirely rewritten, and the Bells got entirely what they wanted."

Most bruising for IXCs: a change in the degree of local competition required for RBOC entry into the long distance market.

The House committee's version required facilities-based competition from another carrier offering service "comparable in price, features and scope" to RBOC service. The new version calls for a combination of facilities-based and resale-based competition and drops the compara-

bility requirements.

President Clinton listed the amended local competition provision among his reasons for threatening to veto telecom reform. Uncowed, the House passed the amended bill 256-149, with the final vote (305-117) sufficient to override a veto.

IXCs were masterfully outlobbied, despite the fact House Commerce chairman Thomas Bliley's (R-Va.) district is home to



EYE OF THE STORM - House Commerce Committee chairman Thomas Bliley

a large AT&T operations facility and he is firmly in the long distance camp.

"[The RBOCs] had a lot of the young Republican leaders speak to [House] Speaker [Newt] Gingrich [R-Ga.], saying that the bill tilted too far in support of one

side rather than the other," claims an IXC lobbyist. "I believe that Chairman Bliley was called in by the Speaker and surrounded and told, 'You will change this bill or you will no longer be chairman,' and I don't think Tom Bliley had a choice."

An RBOC official disagrees, asserting the onerous "price, features and scope" language emerged at the last minute and resulted in a rushed committee vote. "When members of the committee understood the meaning of those words as they applied to telecommunications networks, they understood they had made a mistake, and that's why they put together the manager's amendment."

He disputes the contention that Bliley was bullied. "Certainly the Republican Congress was elected on a platform of less government and less regulation, so it is not unbelievable that the leadership would have said to him, 'How about some less regulation here?' It was a good-faith effort by Chairman Bliley to balance the bill."

A House staffer notes discontent with the original bill surfaced soon after committee passage. Key Democrats criticized the bill's favoritism toward the long distance companies.

"The Bell companies are the folks back home," concludes the staffer. "They are the largest employers in many districts in the country. Sure, AT&T's a big company, and it's got a lot of employees in those states where it's got manufacturing capability. But that's not all of the states; that's only a very few."

IT'S ALL ON THE TABLE

"All sorts of things can happen" in conference committee, the staffer says.

"We are continuing to work with Congress," says Frank Cantrel, MCI's director-government relations. "And if it doesn't improve, we hope the administration will stick with its intent to veto the bill."

The House staffer is confident all the horse trading will result in landmark telecom legislation. Despite the bickering, "the bills are not that far apart," he insists. "Besides, any deadlock will result in there being no bill. There's ample incentive on everybody's side to make the compromises necessary so that we can get a bill to the president for signature."

—also contributing, Jennifer Jones, a Washington, D.C.-based freelance writer

VETO THREAT

President Clinton has threatened to veto communications legislation if it includes a "significant number" of the following H.R. 1555 provisions:

- allows acquisition of unlimited number of radio stations in every community and across the country;
- repeals the newspaper/broadcast and broadcast/cable cross-ownership bans;
- permits RBOCs to offer long distance service before real competition exists in local service, with less than minimum structural safeguards and without DOJ approval;
- allows excessive in-region buyouts between telcos and cable operators;
- deregulates cable service and equipment rates before cable operators face real competition; and
- pre-empt states from telco rate and local competition regulation.



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NOTES ON THE NETWORK

AT&T Network Notes promises new ways of doing business—and new kinds of businesses.

Eric Krapf
Managing Editor

Jody Lane's business—electronically routing documents for real estate closings—barely was imaginable before the network gave rise to talk of a "paperless" future. But Lane believes what's really going to make the business take off is AT&T Network Notes.

Lane's company, TitleLink, employs 15 people, one of whom used to do nothing but manage the network that brought in documents from attorneys, realtors, title companies and lenders.

"I've been able to take that person and put them on development," Lane says. He expects his work force to double by October.

And there are lots more like TitleLink out there, according to Larry Moore, Lotus vice president-interenterprise communication group.

"There is a large segment of the market that, we feel, would rather purchase this service than do it themselves," Moore said at the announcement of AT&T Network Notes' commercial availability.

Besides letting businesses shuck the burden of network management, AT&T Network Notes promises collaborative computing across geographically spread-out areas, fostering new types of business relationships—and new kinds of business-

es. The offering promises support for an "extended enterprise model," says Bob Flanagan, director-workgroup strategies for The Yankee Group.

Of nine initial users announced by AT&T, the majority will use Network

**I BELIEVE IT WILL EVOLVE
INTO MORE OF A PUBLIC-
USAGE ENVIRONMENT. THEY
JUST HAVE TO WORK OUT
HOW TO DO THAT.**

Notes to open up new access among companies, their clients and business partners, who will be able to dial long distance into the AT&T Network Notes service from anywhere in the world. The company plans to begin offering local dial-in access by the fourth quarter.

This access can help small companies and new "network-based businesses," as AT&T calls them, which exist primarily to facilitate connections among other businesses—such as TitleLink.

But Flanagan says AT&T Network Notes also could be a key asset to big companies such as Compaq, an AT&T Network Notes trial customer.

With a base of marketing literature and large collateral distribution system,

Compaq can use AT&T Network Notes as a distribution point when it needs to make changes and get the information out instantly—and securely—to its huge network of value-added resellers.

That's no small accomplishment, according to David Dukes, co-chairman of Ingram Micro, a division of Ingram Industries, the world's largest wholesaler and distributor of computer products, books and videos.

"Access to information in our industry is confusing and difficult at best," Dukes said at the AT&T/Lotus announcement.

Ingram gets 80,000-85,000 calls per month, mostly industry people looking for information off the company's 150 databases, 70 CDs and two on-line systems. Ingram's newly-created InGenious Solutions, Inc. created an AT&T Network Notes-based information dissemination tool called InfoWare-IT as a multi-user, multi-vendor information repository.

Those kinds of solutions will determine network-based Notes's success, Flanagan believes. Notes's capability itself may be helpful, but "really, the critical player in this environment will be the application developer."

NETWORK FUTURE

AT&T says typical Network Notes customers will pay \$25 to \$80 per month per user. The company claims that'll save most users 15% to 25% over private networks. Lane estimates TitleLink's savings on the high end of that range.

The new extended-enterprise model and ability to share data without a wide area network doesn't necessarily mean the WAN's demise, according to Flanagan, who believes WANs will continue to be used for work that stays within a single company's boundaries. But he expects AT&T Network Notes to be an attraction to the public network.

"I believe it will evolve into more of a public-usage environment," Flanagan says. "They just have to work out how to do that."

Once they do work it out, AT&T clearly expects the country—and the network—to be full of new opportunities for people like Jody Lane.

"I'm trying to hook up the real estate world," Lane says. "It's a natural for us. An absolute natural for us."

MORE NOTES

DON'T FORGET ABOUT IBM

Lotus is, after all, an IBM subsidiary now. So, naturally, Notes will be showing up on the IBM Global Network.

Selected IBM Global Network customers already are implementing Notes applications; by yearend IBM says its network's Notes will be in 450 locations in nearly 40 countries. Wider availability is slated for early 1996.

IBM promises its Global Network service for Notes will interoperate with other network implementations, such as AT&T's.

Like the AT&T offering, IBM Global Network's Lotus offering will include not just Notes, but also InterNotes Web Publisher, which converts Lotus Notes applications into World Wide Web pages.



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Sometimes it's lonely out there on the leading edge. Just ask Zenith's Jim Turano. His company's HomeWorks cable modem has been on the market for a year and half, and Zenith's still waiting for the stampede of customers.

"Being the only ones out there, we have the burden to educate cable operators and subscribers," he says. "We had to convince them [operators] this is a business they can make money in. The idea of data was sort of this new thing."

But Zenith finally has some company, as the elusive cable modem seems poised to actually surface in the on-line arena. Time Warner is trialing access to services such as America Online and CompuServe, and cable giant TCI recently issued an RFP for cable modems, which will enable deployment of the company's @Home service.

"There's got to be a marketplace" for the modems and cable Internet access, says Mike Schwartz, vice president-communications for CableLabs. He notes that a dozen cable modems were displayed at this year's national cable show versus three or four a year ago.

"There's a window that our members see," he says. Consumers seem ripe for the picking, having grown accustomed to on-line services and eager to upgrade access speeds.

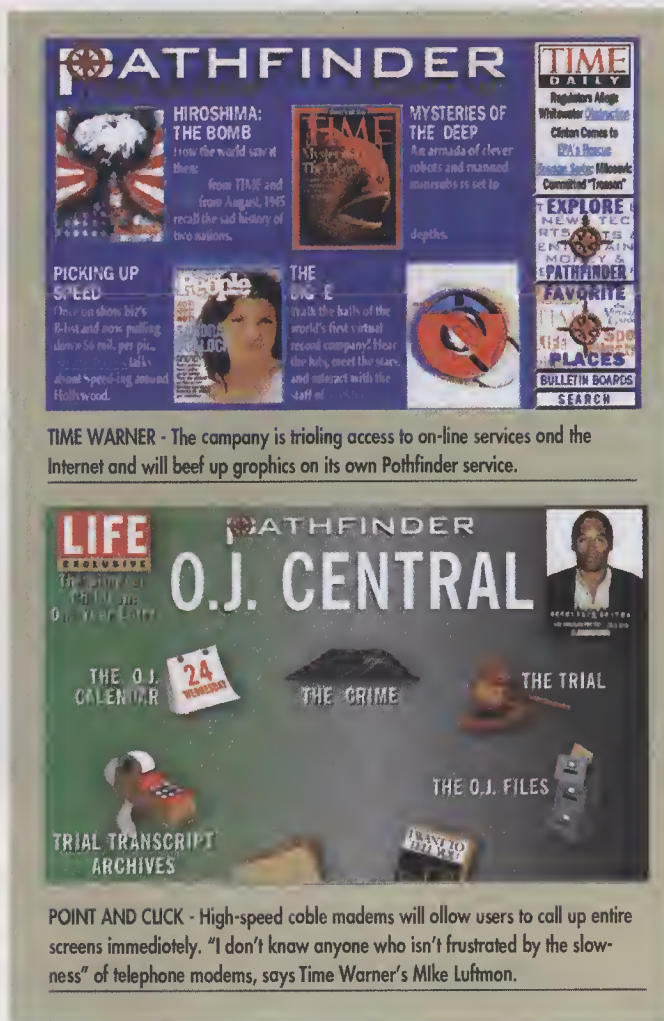
The growth of Internet and on-line subscribership has been "just phenomenal," says Schwartz. The Net's no longer an "academic backwater" but fast becoming user friendly. Turano adds that on-line activity has "really picked up" in the last few months, and consumers are telling service providers, "I need speed."

Which is something cable companies claim they can deliver. "Whatever we do will be faster than the RBOCs," asserts Schwartz. "You could retire or die" trying

ON-LINE CABLE PROVIDERS

MSOs LINE UP FOR CABLE MODEMS

Cable operators get serious about offering high-speed access.



TIME WARNER - The company is trialing access to on-line services and the Internet and will beef up graphics on its own Pathfinder service.

POINT AND CLICK - High-speed cable modems will allow users to call up entire screens immediately. "I don't know anyone who isn't frustrated by the slowness" of telephone modems, says Time Warner's Mike Luftman.

access content at faster speeds, but Time Warner intends to pump up the visuals on its Pathfinder service. "We're going to be putting a lot more graphic content on this," he says.

AOL has similar plans for its service. Access via cable modem "enables us to deliver true multimedia—audio and video," says Lynn Chitow, AOL's vice president-multimedia and Internet. The "compression technology is not there" for real-time audio and video via telephone lines, she says. The "gap begins to close" between telcos and cable operators "as telephone modems come up [in speed]," she notes, but that's not happening fast enough.

Some might say cable operators haven't exactly shown lightning speed either in attacking the access market. But the cable industry doesn't seem worried.

"The cable guys are going to be in the middle of it," insists CableLabs' Schwartz. Turano concurs. Though early reaction to cable on-line access often took the form of "I don't even know what that is," the industry seems to have done a turnaround.

TCI's RFP "gives validity to this as a business," Turano says. And the company's making no bones about the fact it's entering the game for good. @Home will be available "probably early next year in limited areas," says TCI spokesperson Lela Cocoros. The service will offer subscribers

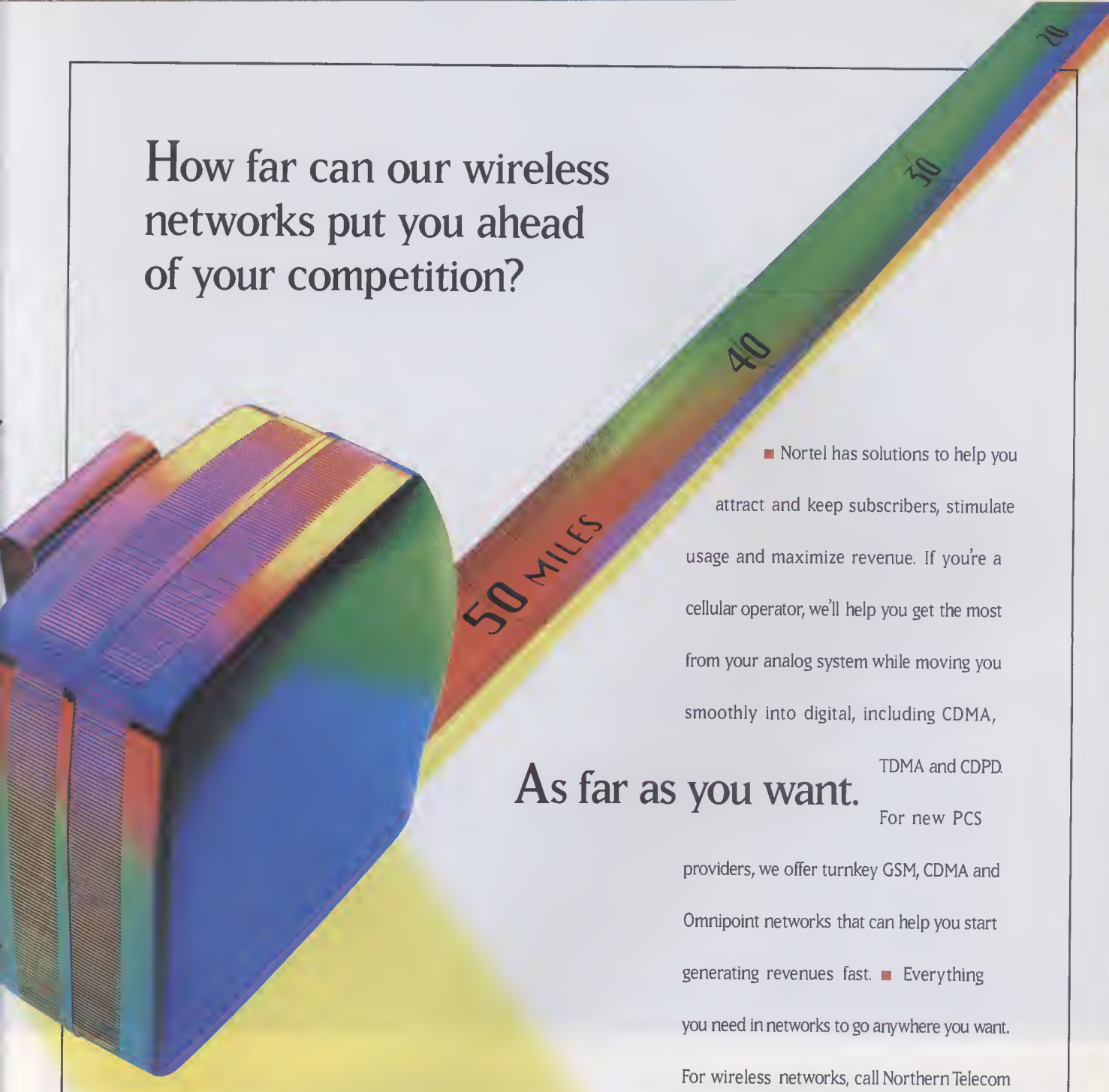
high-speed access to the World Wide Web, the Microsoft Network and other on-line services.

"We're very high on this business," she says. "TCI is working on becoming more than basic cable television." That's not exactly news, but cable operators now have the technology and commitment to compete for on-line access dollars. With a one-two punch of content and high speed, they just might win this race. ■

to download a JPEG file over the telephone network at 14.4 kbps versus 4 Mbps with a cable modem, he says.

Make no mistake, cable operators will promote this advantage heavily. "You just click and the whole screen is there," says Time Warner spokesman Mike Luftman. "That's a powerful selling point. It's not just icing on the cake, it is the cake."

"The benefits are dramatic," he continues. Not only will subscribers be able to



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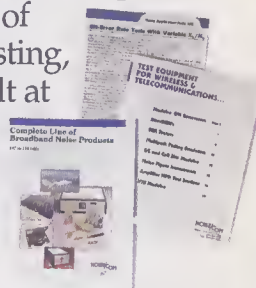
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VIDEO ON THE FLY

Deborah Eby
Washington Editor

Carriers' high hopes for interactive multimedia are fading as financial and technical roadblocks delay service introduction. But an entrepreneurial New York company has found opportunity in this adversity and aims to steal market share from the interactive giants.

"We're going to be the low-cost provider," declares CellularVision CEO Shant Hovnanian, who asserts his company's cellular video service can beat any wireline or wireless competitor on quality and price (*Figure 1*) now and in the future.

"Interactive services are extremely expensive for any hard-wire company to provide," he explains. "It's a construction problem, it's a capital problem. It's just a lot easier to do a wireless alternative."

THE HIGH-FREQUENCY FRONTIER

Veteran engineer Bernard Bossard invented the CV local multipoint distribution service (LMDS)—a fixed microwave system that operates in the high-frequency 28GHz band previously considered suitable only for line-of-sight, point-to-point data communications. Bossard convinced New Jersey real estate tycoons Vahak and Shant Hovnanian to finance further LMDS development, and they founded CellularVision.

Granted an experimental license, the company provides Brooklynites with 49 cable stations and two premium channels. CV has applications pending for 34 more transmitters and hopes to build an LMDS system to serve the region's 3.8 million homes. This summer, the FCC permanently allocated the 27.5GHz-28.35GHz band to LMDS nationwide and plans to auction spectrum in 493 Basic Trading Areas.

Each CV cell has a radius of three miles. A regional network includes a central cell with one satellite or terrestrial microwave downlink facility (*Figure 2*). All cell sites contain an omnidirectional transmitter, and each subscriber has a six-inch-square receiver antenna and a TV set-top tuner.

Video programming is delivered from

satellite transponders, terrestrial microwave facilities or a studio to the central cell headend, which transmits the programming to adjacent cells. Each cell then retransmits signals to adjacent cells, using 200 milliwatt repeaters or background reflectors such as buildings to bounce signals to subscriber receivers outside the transmitting antenna's line of sight.

CV can deliver 49 video channels over 1GHz, each consisting of a 20MHz FM signal. Using "reverse polarization," return

which Hovnanian expects to generate "north of \$5 billion." Bidding against RBOCs and cable companies doesn't faze him.

"We developed the technology and we have a patent on it, so one way or another, I think all of us are going to be doing business together."

CV counts Bell Atlantic, JP Morgan Investment Management and Phillips Electronics as minority investors. The RBOC is not the only telecom player to express curiosity. "Let's just say we've had discussions with a majority of all telecommunications companies, and I'm not talking just in this country," Hovnanian says.

The company already is demonstrating two-way technology, and future applications will include high-speed data, specialized programming that can pinpoint delivery to a single cell, video teleconferencing and local loop bypass. Gearing up for telco service would require little more than installing switching software, says Hovnanian.

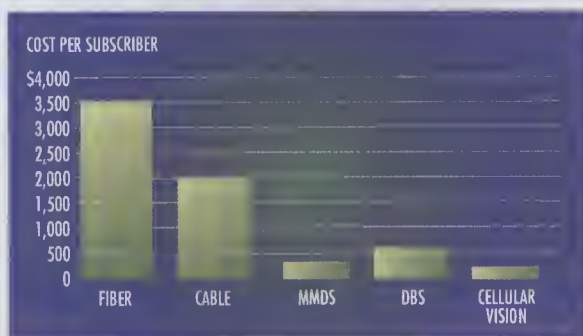
It will take more than sound technology to launch LMDS nationwide, cautions Rick Burke, president of MLJ Consulting. "It's going to take a huge investment and a huge machine in order to build wide-area LMDS multimedia."

CV will battle industry titans such as Sprint, MCI and AT&T, who are having enough trouble breaking RBOCs' local stranglehold. "These are companies whose entire history is based on telecommunications," Burke points out.

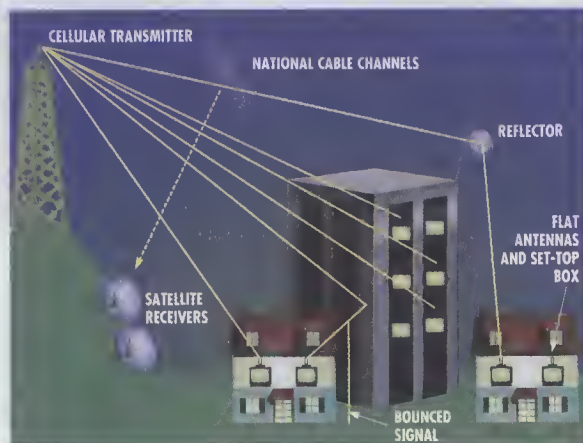
"[CV] is a fairly new entrepreneurial group jumping into an arena that's already very, very difficult to compete in."

Hovnanian remains optimistic and notes CV does not expect to overthrow Ma Bell. "But MCI got a 15% share of the long distance market, and that's a huge business," he notes. "If we get an interactive market share anywhere near that, we've done the consumer a favor in offering a more affordable, high-quality service." ■

BY THE NUMBERS



CELLULAR CABLE AT WORK



paths are inserted between video channels, and signals at the same frequency are used for two different applications simultaneously. The technique also eliminates interference between adjacent cells.

GOING GLOBAL

Hovnanian has set his sights beyond his own backyard and is confident Wall Street will back his ambitions. CV intends to be a major player in the spectrum auction,

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■ BILLING

ELIMINATE THE MONEY PIT

Carriers must change billing practices and reallocate resources.

John Foreman

Today, telecommunications companies spend between 5% and 7.5% of their revenue to generate bills and collect payments. In some companies, aggressive price cutting makes the ratio of billing costs to revenue even worse. Such practices are untenable, as competitive and economic realities soon will force many carriers to rethink long-standing billing approaches.

Wireline, wireless, local and long distance providers must re-orient their billing investments. Instead of throwing dollars into the billing money pit, they must build a technology infrastructure to stimulate, account for and manage usage-based services. In particular, providers must look not only to interactive service management platforms, but also to data warehouses of usage information for maximizing revenues and minimizing delivery costs.

SPENDING 5% TO COLLECT \$45

Every month, service providers lose millions of dollars of profit because of inefficient or outdated billing operations. Carriers spent approximately 3.5% of their revenue on automated billing systems in 1994. Assuming an industry average monthly bill of \$45, this means each bill costs about \$1.50 in automated systems processing costs.

Postage, paper stock, stuffing and slitting machine operations and salaries add another 50 cents to 75 cents per bill. Finally, processing payments, responding to billing inquiries and managing accounts receivable add another 50 cents or more.

Thus, it costs about 5% of the average \$45 to issue bills and process payments. Carriers with error-prone billing systems, churning customer bases or rapidly perforating service offerings may exceed this figure by two or three times.



WORDS TO BILL BY - Current systems provide little more than competitive disadvantage. Flexible, scaleable and table-driven are the wave of the future, according to CSC's Foreman.

Recognizing the competitive disadvantage of current billing systems, carriers are developing flexible, scaleable and responsive billing systems that are table-driven.

Carriers are separating billing functionality into standalone components instead of massive, integrated systems. A centralized data repository controls the collection, storage and staging of billable data. Billable and sometimes non-billable data is collected periodically, often via large batch feeds from network switches and other intelligent service management points. Telecommunications companies are pressured to collect and process event data for their top 20 to 50 customers on a near-real-time basis due to excessive fraud levels and the demands of large end users to control proactively usage of telecommunications services and costs.

Once collected, carriers "rough-rate" billable data daily. Rough-rating associates usage data with customers and supports fraud detection. Today, rough-rating mostly is centralized and uses mainframe-based computing facilities.

Once rough-rated, billable data is stored and staged for final rating and invoice generation. Final rating increasingly is performed by separate rating engines dedicated to specific customers or individual services. The current trend is to downsize rating engines from mainframe platforms and pass maintenance on to sales and customer service professionals. Consolidated billing and customer level reporting, if provided, are completed by pieced-together back-end processes that integrate and sometimes re-rate the outputs of various rating engines.

Business rules for pricing, invoice formats and marketing messages—and sometimes even billing frequency and delivery options—are being extracted from the handwired software code and placed in table or object libraries. This lets users manage and control the billing process. As billing software has become more table-driven, carriers also have linked automated control and testing systems into billing infrastructures to help ensure integrity and accuracy.

Such improvements have increased flexibility greatly and reduced errors typically associated with rapid rollout of new services or customization of core service offerings. Carriers need fewer customer service representatives to research and resolve billing questions and, to a lesser degree, are experiencing reduced churn rates and bad debt levels as billing time lines and accuracy improve.

But billing still is too expensive. To remain profitable, carriers must either

continued on page 36

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BILLING

continued from page 34

raise their average monthly billed amount, cut costs—or both.

To help offset this profitability squeeze, carriers are undertaking new operational strategies. For example, to raise the monthly billed amount, many now resell emerging offerings such as paging and on-line information. To cut operating costs, carriers are investing jointly in automated support capabilities with either partners or competitors and are considering outsourcing non-core processes. Finally, carriers are exploring postalized rates. Sprint, for instance, recently introduced postalized rates by pricing consumers' off-hour calls at 10 cents per minute regardless of distance or duration.

Yet these avenues won't improve a carrier's competitive situation significantly. Because economies of scope (via reselling) and scale (via joint ventures) related to billing costs are limited, it is doubtful carriers can reduce billing-related costs by much more than 10%.

RETHINKING INVESTMENT

No matter how efficient you make it, billing still won't provide the competitive edge a telecommunications company needs to excel in the coming decade.

Providers must stop investing in billing systems that only serve as sophisticated toll booths on the Information Highway and become branders and resellers of a wide spectrum of information and entertainment services.

Successful carriers must redirect investment in billing systems to three new areas: service management platforms, usage repositories and interconnect accounting systems.

Service delivery and control platforms will replace billing as the most tangible aspect of a customer's service and a point of carrier differentiation. SS7 and AIN architectures let carriers offer customers software- and data-dependent interactive services—"500" numbers, voice mail, message services and number portability.

As both customer usage and the spectrum of service offerings expand into data and entertainment, carriers must deploy new automated support systems to enable

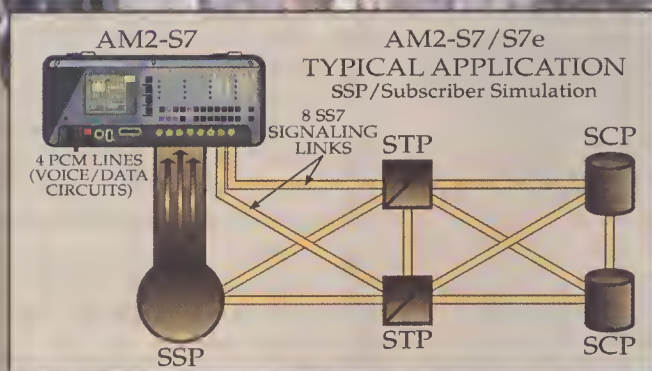
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BILLING

continued from page 36

customers to update service management and usage parameters in real time. Such systems not only allow customers to tailor common services to their unique needs, but also help reduce the carrier's costs of service delivery.

From a future billing system investment perspective, service management platforms will have to access customer-specific data now needed in the billing processes. Examples include a customer's credit worthiness, credit limit restrictions and other customer-specified service access or usage controls. Because the network will need this data precisely at the time of service delivery, each service and customer interaction cannot be unique. As a result, future services will be built up from basic service elements, including associating a standard cost to each service element.

As basic service elements and standard prices are rolled out, much of the data collection and processing now done during billing will be performed by the network in real time. Few carriers will be able to afford investing in new service manage-

ment platforms while retaining current levels of billing infrastructure investment.

Usage repositories are the second area to which money must be reallocated. Sales and marketing costs range from \$200 to \$300 per new account, making customer retention critical. Likewise, it is perhaps twice as profitable to have existing customers increase usage by 10% than to expand the customer base by 10%—even when excluding the \$200 to \$300 per customer in original selling cost.

For customer retention and stimulating network usage, carriers must educate customers to use information and telecommunications services effectively. Large carriers already are deploying customer and service databases and repositories to track individual customer calling and usage patterns. These databases will become significant competitive assets, as they capture information about customers, products and how the customer uses network resources (including calling patterns and even personal preferences).

In the future, such databases will enable providers not only to specify and design segment-wide services, but also to tailor

specific prompts or inquiries to interact with individual customers. Examples include automated reminders to call friends on special occasions and entertainment selections based on viewing habits versus programming schedules. Services oriented to giving a customer a complete solution or time savings will enable providers to increase a customer's monthly billed amount and more tightly couple the customer to the network.

Finally, as reselling, infrastructure partnerships and wholesale distribution channels become standard industry practices, carriers will need more timely interconnection accounting data to ensure they minimize costs related to purchased services and rented or leased facilities. These systems span the gamut from negative files and pattern recognition technology for fraud prevention to cost models that predict the costs of interconnection or "outsourced" services being provided by content, bandwidth and switching capacity suppliers. These new interconnect costs accounting systems will be the third area to which carriers will devote today's investments in billing systems.

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THE BOTTOM LINE

When retooling billing infrastructures, carriers should investigate alternatives carefully. While package billing system components may show quick improvement over billing infrastructures, integrating these packages into the existing environment can be costly. Moreover, packages are the most mature in areas of billing functionality—i.e., invoice formatting and delivery—that may have the least amount of long-term value related to service management, customer retention or usage stimulation.

Carriers should consider billing a cost worth minimizing. Such an approach will leave a larger pool of investment dollars for both revenue-enhancing systems (such as interactive service management platforms and service usage repositories) and cost-reduction systems that help minimize excess capacity or unauthorized usage of valuable network resources.

Providers that adopt this philosophy will be in a prime position to capitalize on the opportunities presented by the Information Superhighway that soon will be running through their own backyards. ■

John Foreman is a partner in the consulting and systems integration unit of Computer Sciences Corp.



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■ WIRELESS

WHO NEEDS SPECTRUM?

Not MCI or Time Warner. They may be onto something; abundant network capacity could make resale a smart wireless strategy.

Eric Krapf
Managing Editor

This time last year, MCI seemed destined to languish with a wireless non-strategy. Its aborted billion-dollar Nextel buyout was followed by a decision not to battle AT&T, the RBOCs and Sprint's cable coalition for PCS spectrum.

But now MCI has cellular resale agreements covering 75% of the population and the top 100 U.S. markets, without spending a dime to build out the national network so coveted by big spenders in the PCS auctions. And despite the IXC's post-Nextel statements that it still would seek strategic partnerships, its ultimate decision

to go it alone with resale—also Time Warner's strategy—is looking better to many in the industry.

Some observers agree with MCI's contention that wireless resale is set to take off—especially when PCS providers bring their networks on line and scramble to compete with six or more rivals for customers in some markets.

With 28,000 new customers signing up for cellular each day, no service provider wants to be left without a wireless component. Those lacking their own wireless networks can forge resale agreements and use their support systems and branding in other services to steal facilities-based providers' customers, or to grow the wireless market even more.

Once PCS gets up and running, "wire-

less reselling will command more attention and clout," says Elliott Hamilton, director-U.S. wireless for MTA/EMCI consultants in Washington. "There'll be a lot of excess capacity in the beginning, and if someone can bring you a lot of customers," a provider will jump at the chance.

MCI realized that all along, according to spokesman Kevin Inda.

"One of the reasons we decided not to bid is that there's no reason for MCI to own infrastructure or spectrum," he says. "We can just buy capacity and integrate it with our other capacities."

"[Service providers] want to sell," Inda points out. "We're a large customer."

Furthermore, the PCS environment will differ from cellular, notes David Gusky, executive director of the National Wireless Resellers Association. Current cellular networks contain little excess capacity; "they don't build a new cell tower until they have the subscribers to support that cell tower."

By contrast, he says, PCS licensees will be under FCC mandate to build out their

networks to reach ever-greater percentages of their markets, increasing the likelihood of abundant capacity.

So wireless airtime five years hence would appear to be a buyer's market. Cellular Telecommunications Industry Association spokesman Michael Houghton agrees with MCI's Inda that resale agreements can benefit both parties; the provider is assured of selling a certain amount of airtime, while leaving the marketing and billing to the reseller.

But Houghton doesn't exactly foresee a spectrum glut. Look closer and you probably won't find seven companies per market aiming at the same customers, argues Houghton. Wireless niche services offer almost limitless possibilities, from telemetry for vending machines to miniature video cameras embedded in police officers' badges. And some PCS licensees are interested in using their spectrum for local-loop bypass, Houghton adds.

NEW RESELLERS

MCI began its assault on the resale market with last spring's \$190 million acquisition of Nationwide Cellular, which already served 300,000 customers in 10 large markets including New York, Chicago, Los Angeles, Philadelphia, San Francisco and Washington, D.C.

The next stage, begun this summer, involves resale agreements with some of the nation's largest cellular carriers. MCI announced deals with GTE Mobilnet, BellSouth, McCaw Cellular, Frontier (formerly Rochester Tel) and New Par, a joint venture between AirTouch and Cellular Communications (CCI) in Ohio and Michigan.

MCI already is offering cellular service in its Friends & Family program. Monthly access charges run \$29.99, and customers receive an allotment of free airtime as well as 50% savings on cellular long distance for one year.

Former Nationwide customers were moved onto Friends & Family as early as mid-summer, though Inda says it's too soon to tell how well MCI Cellular is doing. But he notes the IXC has been adding 60,000 customers a month to its nationwide paging service since it debuted early this year.

Meanwhile, Time Warner is reselling cellular service as part of its Rochester, N.Y., bid to compete against Frontier. Time Warner Telecommunications head Dennis Patrick has boasted his company could reap \$1 billion in revenues by offering cellular in its top 10 to 14 telephone markets (though he didn't say by when).

MTA/EMCI's Hamilton doesn't see any reason why MCI or Time Warner—or any other established provider—shouldn't be successful.

"Really, it comes down to someone with a good marketing name or someone with a good distribution channel using that advantage to get into the market," Hamilton says.

MCI and Time Warner may represent the new face of wireless resale. CTIA estimates there are 100 to 200 U.S. resellers, though Gusky puts the figure at 100 or fewer. Nationwide Cellular, the largest, reported revenues of \$213 million in 1994. The rest tend to be smaller concerns, whose image among carriers is summed up by McCaw Cellular spokesman Bob Ratliffe: "In many cases, the reseller is out

AS A CUSTOMER, I DON'T KNOW IF YOU'LL BE AWARE OF WHO'S PROVIDING YOUR SERVICE.

there trying to turn a quick buck."

Cellular companies are mandated to resell as common carriers. But FCC regulations don't require carriers to like it. "Resellers to us become more work than they are beneficial," says Ratliffe, "just because you have to deal with them all the time."

Most recently, carriers and resellers clashed over the Barton Amendment, a proposed addition to congressional telecom legislation that would have required wireless carriers to unbundle their networks.

CTIA came out strongly against the amendment, arguing resellers could attach their own switches to the unbundled network pieces, thus becoming facilities-based carriers without the massive infra-

structure investment their carrier competitors undertook. Though the amendment failed, "We anticipate it's probably going to resurface again," Houghton says.

As well it should, counters Gusky. "We're not getting anything for free. We expect to pay a fair price for leasing these networks," he says.

As for the argument that carriers invested in infrastructure, Gusky responds, "Most of these cellular carriers were *given* these licenses, and they should not be allowed to lock up the networks."

Even though PCS opens up more spectrum, Gusky insists the market needs resellers for competition because the usual suspects are building the PCS systems. "Have you looked at who won these PCS networks?" he says. "It's the same people who have cellular."

McCaw's Ratliffe, in turn, maintains resale end users aren't guaranteed the same quality they'd receive from the network provider, which will make resellers less attractive to users.

As a provider, "you have control over your network. You have control over the services you provide and the systems you provide," Ratliffe says.

But Hamilton maintains control should be a non-issue to the end user, especially if the reseller is an established wireline provider. "I don't see it being that complicating a factor," Hamilton says. "As a customer, I don't know if you'll be aware of who's providing your service."

McCaw, which officially changes its name this month to reflect its purchase by AT&T, intends to see to it that you *are* aware. AT&T will use its national facilities to offer custom wireless solutions. "Our goal is to change people's lives," Ratliffe asserts.

And he's not too concerned about the likes of MCI and Time Warner using that network to get in on the wireless boom. "People want to get into it in any way," Ratliffe says. "The fact is, everybody wants to be in everybody else's business."

That's one area where carriers and resellers agree. Whether it's local, long distance or wireless service, Gusky insists, "Everybody's going to be reselling their service in some form or fashion." ■

■ UNDERSEA INSTALLATION

FLAG WAVING

Thanks to a unique combination of financing and coalition building, work on the world's longest fiber cable is ready to set sail.



KEEPING BUSY - Thanks to the FLAG project, cable ships will have plenty of work over the next few years. The project, which will string fiber from Japan to the UK, will cross three oceans and have landing points in a dozen countries.

Arielle Emmett

Here is a modest proposal worthy of the Sultans of Arabia circa 1990s: Install the longest fiber optic cable in the world—roughly equivalent in miles and routing to Marco Polo's land and sea trek from Europe to Cathay and Nippon—and get private investors to pay for it. Sell capacity in “as you need it” increments to international carriers and PTTs rather than forcing them to buy infrastructure—then split the capitalization cost, profits and risk among a coterie of Japanese, Saudi Arabian, Thai, Jordanian, Chinese, Canadian and American investors. Finally, get a leading RBOC—Nynex in this instance—to oversee the project and manage all the technical and administrative headaches,

giving the dirty work of actual cable installation to AT&T and KDD Submarine Systems, Japan, which operate on a two-year deployment schedule—first to last splice—all 17,000 miles in serpentine length.

A project more than four times the length of the Great Wall should ring a few brass bells around the globe these days. And industry analysts agree that FLAG (Fiberoptic Link Around the Globe) is the one of telecom industry's most intriguing investment gambles. Last month, a once and future \$1.5 billion capitalization pipe dream finally got the green light, with more than 40 carriers around the world signing agreements to purchase capacity.

Construction and finance agreements now are in place to build FLAG—a deal cut privately between two commercial

banks and six sponsoring companies: Nynex, Marubeni Corp. (Japan), Dallah Al Baraka Group (Saudi Arabia), Telecom Holding Co. Ltd. (Thailand), The Asian Infrastructure Fund (Hong Kong) and Gulf Associates, USA.

When finished in September 1997, the project will be the largest privately funded fiber cable linking the Old World, spanning three continents and three oceans. The network will offer 5 Gbps data rates, Synchronous Digital Hierarchy (SDH) compatibility for voice, data, image and text, 120,000 digital circuits and an “on-demand” pricing structure that gives PTTs a more competitive and variable means

of purchasing bandwidth they need.

ALL SYSTEMS GO

“FLAG now has enough investors to make it go, and they're committed, although before people kept withdrawing,” notes Audrey Mandela, international vice president at The Yankee Group, London.

“Up until now, investors weren't sure they wanted to undertake this,” she continues. “But there's a recognition that a fiber route of this sort is needed. There are still some parts of the world, the Middle East in particular, where the primary means of telecommunications is satellite; and this precludes construction of high-bandwidth, high-performance networks like ATM. Nynex recognized that the existence of another fiber route will help drive prices down for global network services, and get-

ting in there and constructing the network will fill the need. It will also help Nynex realize its ambitions to become a global network company."

Installation work on FLAG already is proceeding apace on two overland crossings—one in Egypt, the other in Thailand—and shortly, cable ships will work simultaneously to install at different points along the route, which includes 12 landing stations, most of them undersea. Telecommunications carriers in a dozen countries will oversee construction of landing stations, each costing from \$60 million to \$100 million, and facilities connecting their national networks to the cabling system. Landing points will be located in the UK, Spain, Italy, Egypt, the United Arab Emirates, India, Thailand, Malaysia, Hong Kong, China, Korea and Japan. Saudi Arabia thus far has not agreed to a landing site, although the country does plan to use backhaul facilities to link the fiber at another site to the interior of the Saudi Republic.

"Our original concept was to make a fiber optic loop through the Middle East, to fill a vacuum in capacity," says Hormoz Sabet, chairman and CEO of Gulf Associates and initiator of the project. FLAG is just one of 83 ventures he has conducted over the years as leader of the high-stakes investment corporation. In fact, the FLAG idea was hatched when Sabet chanced on a *Wall Street Journal* article in 1990 describing telecommunications shortfalls and satellite echoes in the Middle East. Sabet began to wonder whether a privately-funded fiber link was feasible.

OPPORTUNITY

"There has never been a single and competitively-priced direct cable link between Europe, the Middle East and the Far East even though there are partial 'club' cable configurations that extend along sections of the route [such as the SEA-ME-WE cabling projects sponsored by various PTTs]," says Sabet. "We saw an opportunity here, but the biggest obstacle was convincing the telecom industry and to gather

various partners to put together the deals to make it happen."

Early on, Sabet approached Nynex about doing an in-depth feasibility study for the project, which continued in the 1992-1993 time frame. He also went globe trotting to gather up investors with substantial capital assets, most notably the Dallah Al Baraka Group of Saudi Arabia, headquartered in Jeddah, with diversified holdings of over \$6 billion, mostly in manufacturing, transportation and cable TV. Nynex

acknowledged the company was intent on pursuing a high-profile fiber project.

"In the '80s, we actively pursued PTAT [Private Transatlantic Telephone]; like FLAG, the cable was to be privately built by Nynex and the UK's Cable & Wireless."

WAIVER DENIED

Nynex withdrew from PTAT once Judge Harold Greene refused to grant an MFJ waiver enabling the RBOC to land the cable both in the UK and the U.S.

"Basically, we weren't allowed to provide international long-distance service from the U.S.; those were the rules, and we were denied the waiver, and so we did not pursue it. FLAG doesn't have the same problem. It's not a transatlantic cable," the spokesperson says.

"Besides, the prospects of a feasibility study were not all that risky."

"Originally, Gulf Associates pursued the concept of a privately funded fiber cable linking the Middle East only," continues Timpanaro. "But after contacting Nynex in 1991 to do the feasibility study, Gulf realized there was an opportunity that was not originally perceived. A link could be expanded all the way from the UK to Japan and offer a unique pricing structure," he adds. "For example, in a traditional fiber system, an international carrier has a need for facilities connecting three or four countries and so purchases the

infrastructure and sells excess capacity to the PTTs. The general requirement is to sell capacity based on a long-term forecast of circuits needed and the total cost of the system. The concept here is completely different: FLAG isn't underwritten by international carriers; it's private. Instead of PTTs or carriers having to buy circuits based on five to 10 years' forecasts, they can buy now via segments [of the route] and reduce their risk by forecasting capacity needs only two to three years out. It's a concept based on variable estimates. That's better capital utilization."

In addition, Timpanaro argues, FLAG will offer a streamlined "one stop shop" that carriers should like. "Traditionally, if

continued on page 44

INTERNATIONAL CARRIERS WORKING WITH FLAG LTD.

UK: Mercury Communications

SPAIN: Telefonico

ITALY: IRITEL S.p.A.

EGYPT: ARENTO

UNITED ARAB EMIRATES: Emirates Telecommunications Corp.

INDIA: Videsh Sanchar Nigam Ltd.

THAILAND: The Communication Authority of Thailand

MALAYSIA: Telekom Malaysia Berhad

HONG KONG: Hong Kong Telecom International Ltd.

CHINA: Directorate General of Telecommunications

KOREA: Korea Telecom

JAPAN: International Digital Communications

was sought out because "obviously the project really needed a strong telecom partner," says Joseph Timpanaro, chairman and CEO of FLAG Ltd., the newly-formed consortium for the project.

From Nynex's perspective, the managing partner's role for a project this ambitious was attractive. "It's been Nynex's international business strategy to build and operate major infrastructure projects for the past three to four years," Timpanaro says, citing Nynex's joint venture with TelecomAsia to build a 2 million-line network expansion in Bangkok, as well as its infrastructure work in the UK.

Although Timpanaro says he does not know whether other RBOCs were approached, a Nynex spokesperson recently

FLAG

continued from page 43

you wanted to go from the UK to Japan, you might need to connect with five different carriers to get point to point. An international carrier might have to buy capacity from two or three cable systems. With FLAG, you deal with one carrier, one point-to-point price, even though you may cross seven or eight locations."

Sabet adds, "FLAG isn't priced by distance or length of circuit. Marketing capacity by segment lets us be a lot more competitive in pricing."

Whether the market for capacity holds up, even over a two-year period, remains anyone's guess, however.

The Yankee Group's Mandela wonders whether international competition will create a capacity glut in certain high-traffic segments of the proposed route. "A risk is that there will be too much capacity, and there won't be a need for another player; FLAG investors may find they are left out," she says. The more likely scenario, though,

is that FLAG will take longer to recoup its \$1.5 billion investment (\$1.2 billion of which already is earmarked for AT&T Marine Systems and KDD Marine Systems to complete physical construction of the

is scheduled in Dubai in early December to finalize agreements among carriers. "There are no real concerns about the construction or technical work," he says. "Our focus is on the deals and thus far, preliminary sales have been very successful."

Sabet revels in his own story. "From a human relations point of view, this proves that a human being without a lot of capital can put together a large consortium. And now we're the biggest shareholder in a \$1.5 billion global telecom project. It's another fulfillment of the American Dream."

Although he will not say how much, Sabet notes Gulf Associates is not a major capital source for the project. "Our contribution has been perseverance. We're the ones who put the concept together all the way from inception to the cutting of ribbons. It's a David and Goliath situation. We happen to be the right people at the right time with the right idea." ■

Arielle Emmett is a Philadelphia-based freelance writer.

FLAG LANDING POINTS

Porthcurno, UK	Suez, Egypt	Songkhla, Thailand
Estepona, Spain	Fujairah, U.A. E.	Lantau Island, Hong Kong
Palermo, Italy	Bombay, India	Shanghai, China
Alexandria, Egypt	Penang, Malaysia	Keoje, Korea

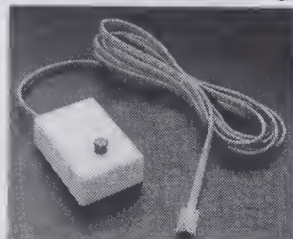
network). "Our biggest challenge right now," says Sabet, "is to sell capacity." Already, there is too much capacity in the Middle East and Asia; however, the forecast is for a shortfall by the time FLAG is finished, according to Sabet. "This is a reasonable window of opportunity," he says.

An international sales organization already is deployed in Europe, the Middle East and Asia to sell capacity, and a meeting

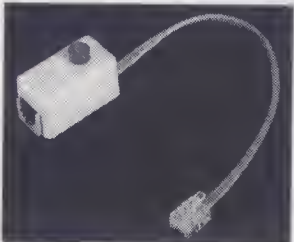
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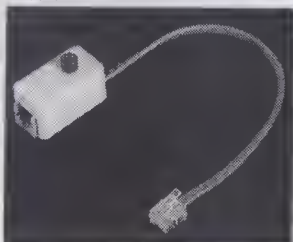
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MWV-1



MKIM



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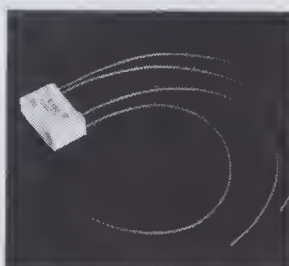
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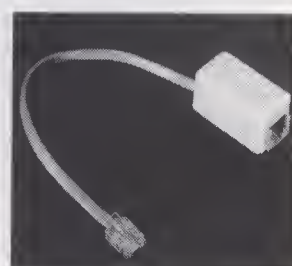


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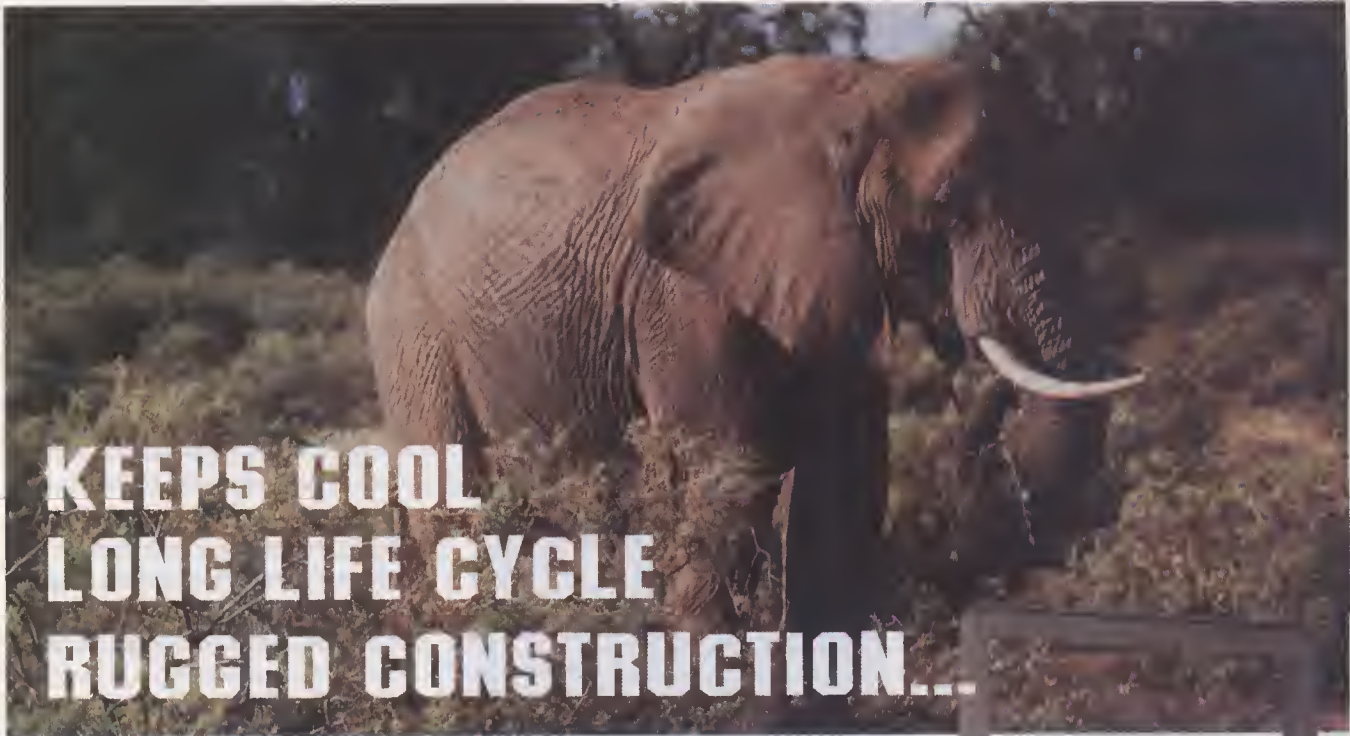
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TAKING THE HEAT OFF OUTSIDE PLANT

As carriers expand systems, they need to pay attention to heat dissipation.

Temperatures soared around the country this summer, stressing personal tolerances among air conditioning have-nots. And while outdoor network equipment handles heat and humidity better than humans do, temperature has its effects on network reliability as well.

Broadband system operators should be aware that heat affects network equipment. The importance and priority placed on these conditions often depend on system location and network upgrade plans.

Well grounded in physics, IC component failure rates double for every 9°C increase in operating temperature. The implications are obvious. Amplifiers or other system components placed in outside enclosures—without environmental control—could face shortened operating lives when subjected to extreme heat or temperature swings.

The failure statistics stem from U.S. Department of Defense (DoD) component reliability testing and are published in a military specification handbook, MIL-HDBK-217. It contains maximum allowable failure rates on hundreds of military specifications for thousands of equipment parts. "MIL-SPECs are the same specifications you'd apply to a Patriot missile. They're extremely stringent reliability and quality measurements," says Jim Van Cleve, vice president-engineering for Navcom Defense Electronics, a former General Instrument vice president who introduced CATV industry heat-related IC component reliability issues 10 years ago.

The issue is whether and how these concerns apply to broadband system design and/or system upgrades. "As you add more channels, your peak voltage goes up," he continues. "You have so many millivolts per channel that you have to deliver. Amplifiers have to be linear and that means more heat."

Van Cleve suggests carriers be aware of heat's effect on system components, such as amplifiers, as they upgrade broadband systems to higher frequencies, more channel capacity and new service offerings.



KEEP COOL - Mast pedestal covers have fins and heat sinks, but it takes more to ensure proper dissipation.

The caution extends to components placed inside outdoor enclosures. Consideration seems especially prudent as CATV systems become a competitive option for dial-tone. "As you get into telephone service and some of these higher-priced services, the reliability has to be as good as the telephone system or better," he says.

"Power drain has gone up," he continues. "Power systems have gotten more efficient, but basically if you had an old 40-channel system and it had a line extender that drew a few tens of watts, and [you] removed it and put in something that drew 40 watts, you could incinerate it." It's an extreme example and possibly unlikely, but the underlying trend isn't—operators are upgrading their systems.

At the bare minimum, operators increase channel capacity by upgrading component operating frequencies. And that means changing old amplifiers for newer ones operating at the higher frequencies. But how amplifier manufacturers achieve the higher frequencies should be a system design concern.

The amount of heat generated varies

with design. Placing two amplifiers in parallel to achieve higher frequencies generates more heat than new designs with power consumption and heat generation concerns in mind. "Amplifier manufacturers will pay

attention to heat because it causes variations in the signal," says George Sell, market research and product development coordinator at Channel Commercial. "They have thermal compensation networks to compensate at different temperatures for the signals passing through." Design can't control all variables, though.

LACK OF PROCEDURES

Amplifier manufacturers design housings with heat sinks and fins to dissipate heat, so it's not a completely ignored condition. But there's a lack of design or operating procedures for amplifiers placed into enclosed pedestals. "If these amplifiers are going to be out in the open air, there may not be a problem," he continues. "But if they're in an enclosure and heat impacts reliability, you'd want to know what kind of heat I can expect this device to generate."

Migration physics causes IC component reliability deterioration as a result of heat. "It's migration of metalization inside the integrated circuit," explains Van Cleve. "If I have two gold traces on a piece of silicon, with temperature the gold will tend to migrate over and there's a probability that they'll jump the gap. They keep getting closer and eventually you'll get a short."

The migration increases proportionately with temperature. "But when you get to 125°C all bets are off because ICs will fail immediately. It's a fundamental rule of physics. It's not going to go away, but as they come up with different metals, it could get better."

Wide temperature swings also have detrimental effects. "A second failure mechanism is temperature cycling," adds Van Cleve. "It's like metal bending. When you bend a piece of metal back and forth continuously, it will eventually break." Cycling speed is a greater factor than wide temperature swings, and seasonal variations play less of a role than night-to-day

variations, he says.

Beyond system channel increases, many operators are considering or already are installing two-way capability. But providing reverse transmission capability requires reverse amplifiers. And while lower powered, they generate heat nonetheless.

Placing reverse amplifiers into existing outside enclosures seems an obvious choice because they need to be collocated and the housing already is present. "If you had a system operating at 400MHz built in the last seven or eight years, there are modules available that allow you to do an economic changeout instead of having to replace housings and power supplies," says Hugh McCarley, director-engineering/cable television for Cox Communications.

But adding components to existing pedestals affects heat dissipation capabilities and could impact overall network component reliability. "Enclosures are expected to dissipate heat in a passive way by paying attention to good design principles so heat is contained and dissipated," explains Sell. Altering dissipation dynamics with additional components changes original enclosure engineering design prin-

ciples. Whether it's serious enough to worry about remains an issue, and it's unclear who has responsibility.

NO ONE TAKING THE LEAD

System reliability affects customer service quality, and the system operators retain ultimate responsibility. But operators often rely on component and system manufacturers for engineering and design guidance. And with heat dissipation issues, no one's taking the lead.

"We don't worry about [heat] as much as the manufacturers themselves. The equipment is manufactured to operate under those temperature extremes," says Cox's McCarley. "Probably 60 to 80% of our down time is power related and that's due to the commercial power we're drawing. I don't think heat has been a big issue."

Enclosure manufacturers deal with heat dissipation, but often receive inadequate operating specifics from component manufacturers. "Amplifier manufacturers don't talk about temperature other than referring to an operating temperature range," insists Sell. "According to the military's analysis, what's meaningful is not a threshold but increments of temperature rising."

And while component reliability is every system and amplifier manufacturer's goal, heat dissipation may not be a primary concern. "Additional features such as reverse capability and higher performance [affect] current draw, which is what produces the heat," says Andy Meyer, director-marketing/transmission systems for Scientific-Atlanta. "It's an issue that [operators] have to understand, but on our list of 20, it's number 18."

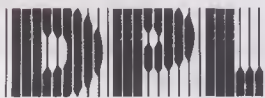
Regardless of who claims responsibility, heat and its effect on component reliability is an issue. System operators upgrading and expanding capacity and services should understand the local implications, says Sell. "For the reliability of the system and from the point of view of the customer, you're getting into a situation where it's a lifeline service and reliability is very important."

"The real point is, if you've got a system in a town and you know your pedestals are causing a great deal of heat, you may want to do something different," adds Van Cleve. "If your line extender blows during a Super Bowl, you've lost those customers forever. They'll go out and get a satellite dish."

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47



FUSION SPLICER - Siecor's new FuseLite allows for factory-installed connectors, giving carriers the assurance of low-loss connections. It also can be used for more traditional fiber-to-fiber splicing in the field.

■ NEW PRODUCTS

FUSION FACTORY

Siecor develops a low-cost connector for CO and outside plant environment.

Vince Vittore
Associate Editor

As telcos delve into video services and cable TV providers into dial-tone, the debate will continue over which architecture—hybrid fiber/coax or fiber to the curb—is more appropriate.

Regardless of the winner, fiber will move closer to the customer. And that means more fiber splices and connections in both the outside plant and in the central office/headend.

Because video and data will be running over those same lines, low-loss splices and connectors will be more important than ever, which means increased use of fusion splicing.

Many telcos and cable TV companies already rely on fusion splicing for all installations. "They [CATV operators and telcos] have an aversion to mechanical

splicing. They'll leave mechanical splicing to repair almost exclusively," says Martin Curran, market manager-fiber joining products at Siecor.

For many carriers, though, the cost of fusion splicing prohibits widespread use.

To bring down costs, Siecor has developed a system that combines the advantages of optical connectors with those of fusion splicing. The FuseLite Termination System performs fusion splices within the physical boundaries of an optical connector, providing factory-installed connector performance with the simplified field-installation technicians want.

Demand for higher-quality field-installable connectors led to the development, says Curran. "The consistency is becoming the issue."

Additionally, the systems can be converted quickly to perform fiber-to-fiber splicing in the field.

The system is assembled in the factory when a cleaved fiber is installed in the FuseLite connector ferrule and polished. This latter portion is one of the most important aspects, says Curran, because it eliminates the need for polishing in the field and reduces the amount of equipment technicians must deal with. It also increases the quality of the termination and reduces installation time.

(Note: FuseLite doesn't require any epoxy or index matching material.)

According to Curran, the ferrule is similar to the company's CamLite mechanical splice except in one key area: the CamLite has a V-groove in which to place the splice, while FuseLite ferrule is slotted.

A specially-designed low-cost micro fusion splicer then is used to fuse single-mode or multimode fiber within the connector ferrule. Once the splice is completed, an integral crimping mechanism performs the 900 μ m crimp to ensure a zero-stress condition. Appropriate hardware dependent on the connector type (SC-, FC- and ST-compatible) is snapped into place and the connector is ready.

In most cases, carriers will use the system to create fusion pigtails with single-mode fiber, notes Curran. However, it also can be used in hybrid environments with multimode fiber.

In addition to the connectors, the system comes with a FuseLite splicer, which can be used for standard fiber-to-fiber fusion splicing by attaching an adapter unit.

PERFORMANCE COUNTS

So far, Siecor consistently has manufactured connectors in the factory with an average splice loss of 0.09dB, well below most carriers' threshold. Just as important, the factory polishing procedure controls the fiber position to +50/-100nm.

The company currently is recommending use of the system only in indoor areas such as the central office/headend. However, it hopes to expand that to the outside plant soon.

Siecor will begin field trials this year, with commercial availability shortly thereafter.

"The question was, could we do the same with FuseLite as we did with CamLight [a commercial success]?" says Curran. "This is one of those times when you hope being first doesn't hurt." ■



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PLAIN OLD TV— AND BEYOND

VESA calls for proposals on protocols and interfaces to create a unified home network.

Eric Krapf
Managing Editor

Forget about plain old telephone service (POTS). The VESA Open Set-top Committee has a new subcommittee charged with taking us into the age of plain old television (POTV).

The group's Home Network Subcommittee issued a call for proposals to standardize protocols and interfaces for systems that would offer centralized control for all of a home's electronic devices: telephones, video (from the aforementioned POTV to interactive and HDTV), home computers and energy management.

The subcommittee agreed on an architecture based on multiple providers bringing their services to separate network interface units (NIUs) at the home demarcation point. The traditional set-top box would be replaced by several "network ports" (NPs), each controlling a different service and its affiliated CPE: one NP for telephony, one for computers and so on.

It's a "very ambitious" effort, concedes subcommittee co-chairman Joel DiGirolamo, manager-printer compatibility for Lexmark International, an IBM spinoff that manufactures printers. Scientific-Atlanta's Bob Luff uses the same word to characterize the subcommittee's charge, but welcomes an industry effort to get ahead of the curve on new technology for a change.

"The pace of growth and development and vision is outstripping the speed at which the standards process proceeds," says Luff, S-A's chief technical officer-broadband communications. Luff works with both VESA and DAVIC, the international group working toward end-to-end

digital video and audio protocols and interfaces.

The VESA subcommittee's stated goal is to "develop a flexible, open network architecture for the home," the call for proposals states. Specifically, the architecture should:

- provide an interoperability specification allowing transfer of information from any home device to another;
- allow interoperability between different networks from low to high bandwidth;
- transition from analog to all-digital distribution;
- provide a common interface on the home side of the NIU; and
- provide directory services for home devices.

Above all, specifications must allow for a scaleable, flexible home network. "We have a great desire to keep the cost low so,

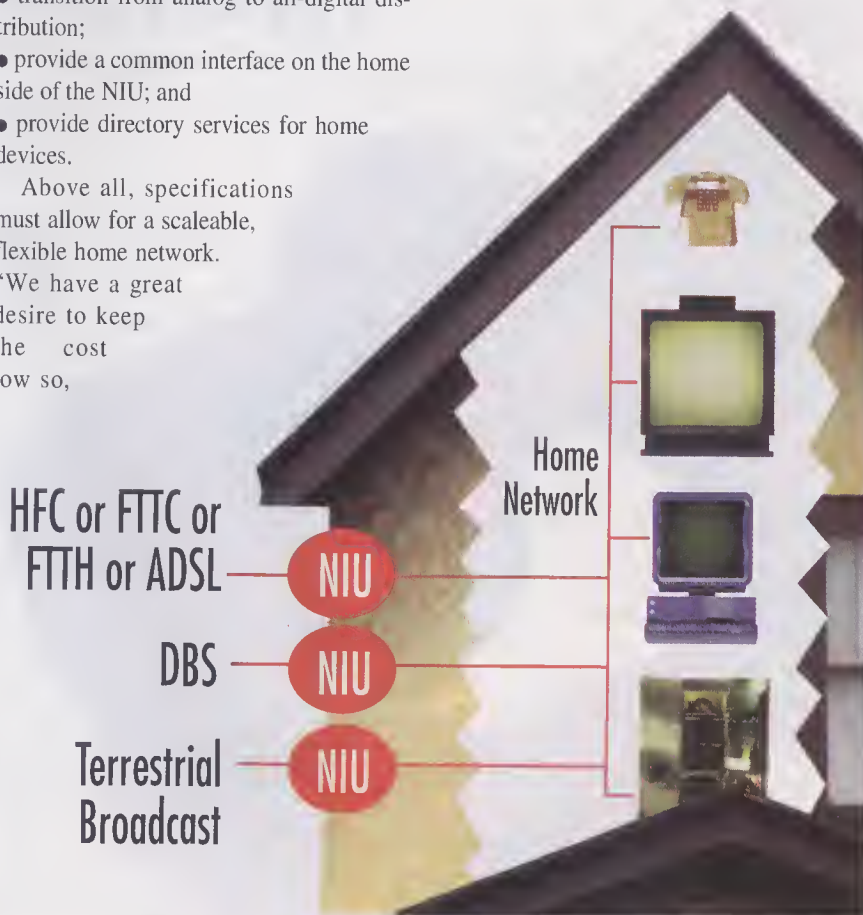
number one, the stuff'll get adopted and, number two, it'll be buildable," DiGirolamo says. To that end, the call for proposals demands backward compatibility and the ability to accommodate analog as well as digital data.

BANDWIDTH EFFICIENCY

Separating the different networks within the home also is intended to keep down customers' cost. The subcommittee believes this will give customers the most efficient bandwidth use. The call for proposals also requires channel selection at the NIU or before, to limit bandwidth needed downstream from the NIU, also enabling such relatively lower-bandwidth technologies as ADSL.

Among other NIU features:

- A simple standard interface between the NIU and the home



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The subcommittee's schedule calls for a technical committee to develop an initial draft by next June. "By the end of the year, we want to hash out an overall conceptual way to approach it," after which the subcommittee will break into working groups, DiGirolamo says.

SLOW TAKEOFF

Luff applauds VESA's phased approach to the home network and its emphasis on affordability, but believes the market lags far behind the kinds of services spelled out by the subcommittee. He notes hardware has been demonstrated successfully in interactive trials, yet such services have yet to take off.

"These systems really can't flourish because there really isn't any content,"

pieces out there. "Some think once people get a taste, they're going to want more and they're going to want to hook [up] more devices."

VESA represents an extension of efforts such as DAVIC's, according to Luff. VESA's broad charge for the Home Network Subcommittee makes sense; DAVIC's own definition of "end to end" has broadened over the group's life span, he argues. On the customer end, DAVIC's efforts crept from the NIU to the set-top; on the provider end, the group moved from the headend deeper into the content generation process, to issues of digital image capturing.

"The two ends of the DAVIC mission keep expanding," Luff says. "The real beginning is Steven Spielberg's mind." ■

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Cable TV (CATV) System Operator

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12 ☐ 12 Independent Cable TV System
13 ☐ 13 Cable TV Contractor/Engineering Firm
14 ☐ 14 Other Cable

Wireless Operators

15 ☐ 15 Cellular Operator
16 ☐ 16 PCS/PCN Operator
17 ☐ 17 Other Wireless

18 ☐ 18 Long-distance/Interchange Carrier
19 ☐ 19 Competitive Access Provider (CAP)
20 ☐ 20 Telecommunications Reseller
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41 ☐ 41 7 Customer Service
42 ☐ 42 8 Other (describe)

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101	130	159	188	217	246	275
102	131	160	189	218	247	276
103	132	161	190	219	248	277
104	133	162	191	220	249	278
105	134	163	192	221	250	279
106	135	164	193	222	251	280
107	136	165	194	223	252	281
108	137	166	195	224	253	282
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111	140	169	198	227	256	285
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127	156	185	214	243	272	
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The system will use 20,000 or more of Augat's 750MHz SDA amplifiers to serve more than 3600 miles of cable. Installation will be carried out over the next five years.

The contract's value was not disclosed. ■

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desire to keep the cost low so,

**HFC or FTTC or
FTTH or ADSL**

DBS

**Terrestrial
Broadcast**

NIU

NIU

NIU

**Home
Network**



network for digital video.

- Support for upstream video, though asymmetric data flow is anticipated.
- Error handling, conditional access and security take place at the NIU; the NIU provides the "firewall," eliminating need for the home network to be secure.

To put together a standards set for the home network, VESA likely will borrow from existing work on network segments to avoid duplicating effort and creating more conflict. For example, the subcommittee probably will adopt some standards completed by EIU or DAVIC, according to DiGirolamo. Standards most likely to be developed by the subcommittee itself include portions dealing with telephony,

Luff says. "Until those content providers start coming on line briskly, there really isn't a business here."

And Luff will wait and see whether affordable CPE for a home network emerges soon.

COST BARRIER

"While we're all for getting standards ready for some eventuality in the future," he says, "next to lack of content, the costs of the in-home products are the real hurdles to be crossed." He's "very confident" the set-top as we know it will dominate at least through the decade's end, "but we want standards and protocols ready" when the transition does occur. In the meantime,

SCIENTIFIC-ATLANTA'S BOB LUFF WELCOMES AN EFFORT TO GET AHEAD OF THE CURVE: "THE PACE OF GROWTH AND DEVELOPMENT AND VISION IS OUTSTRIPPING THE SPEED AT WHICH THE STANDARDS PROCESS PROCEEDS."

home automation and the home audio/video digital network (the HDTV/computer component, separated from analog POTV).

Besides S-A, the Home Network Subcommittee includes members from companies such as Apple, AT&T, Hewlett-Packard, Motorola and Samsung.

The subcommittee's schedule calls for a technical committee to develop an initial draft by next June. "By the end of the year, we want to hash out an overall conceptual way to approach it," after which the subcommittee will break into working groups, DiGirolamo says.

SLOW TAKEOFF

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"These systems really can't flourish because there really isn't any content,"

there's "a crying need for some secondary distribution system" that will multiplex CATV signals to more than one television—in other words, something in between the current architecture and VESA's ultimate goal.

But DiGirolamo believes the biggest hurdle may be just getting interactive services out there. "Some think once people get a taste, they're going to want more and they're going to want to hook [up] more devices."

VESA represents an extension of efforts such as DAVIC's, according to Luff. VESA's broad charge for the Home Network Subcommittee makes sense; DAVIC's own definition of "end to end" has broadened over the group's life span, he argues. On the customer end, DAVIC's efforts crept from the NIU to the set-top; on the provider end, the group moved from the headend deeper into the content generation process, to issues of digital image capturing.

"The two ends of the DAVIC mission keep expanding," Luff says. "The real beginning is Steven Spielberg's mind." ■

C O N T R A C T L O G

American Personal Communications has signed a \$10 million contract with **Nokia Mobile Phones** for wireless handsets to serve the Washington, D.C., market in what is expected to be the first PCS rollout later this year.

The 8.3 oz. handsets can transmit data at 9.6 kbps and display short messages. Future upgrades will allow 19.2 kbps transmission. APC is using the GSM standard PCS 1900.

The network will offer advanced services including caller ID and call screening.

APC is affiliated with Sprint, which is assembling a nationwide PCS network with its cable partners.

Sprint/United Telephone-Florida has installed a six-node OC-48, four-fiber ring from **NEC America**. The ring serves the high-volume region of Maitland Park and is the first of 13 rings Sprint/United plans.

The ring uses six NEC ITS-2400V Sonet multiplexers, supporting full time-slot assignment across the 48 STS-1 time slots for maximum flexibility in service planning. NEC pre-wired, delivered, tested and won acceptance for the ring in only two months.

Sprint/United is expected to increase capacity soon through narrow-band wave division multiplexing, which quadruples throughput in outside plant fibers. The ring already provides the highest capacity now commercially available.

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IMPROVING TDMA VOICE QUALITY

Bellcore hopes PACS's advantages outshine its mobility limitations.

Eric Krapf
Managing Editor

Now that its TDMA-based standard is being finalized, Bellcore is pushing for PCS providers to take another look at PACS, a rival standard Bellcore claims provides superior voice quality.

"I think PACS has been a light under a bushel, as they say," asserts Peter Jewell, Bellcore director-wireless operations systems engineering.

"It had a lot to do with the urgency with which service providers thought this industry was going to come about," Jewell explains. "Given the initial schedule, people needed technologies that were going to be available at that time." Jewell believes standards and deployment schedules are more in sync now.

Final balloting is complete on the standard, which Bellcore developed by adapt-

ing Wireless Access Communications System (WACS), which was created strictly as a low-mobility standard. WACS was combined with elements of Japan's Personal Handy-phone (PHP) to create Personal Access Communications System or PACS.

Bellcore may have an uphill struggle getting PACS accepted for PCS over the better-established IS-136 TDMA standard,

but PACS's superior voice quality could win converts in wireless local loop applications, as well as low-mobility PCS.

PACS has three inherent advantages over IS-136 and its cellular equivalent, IS-54, Jewell contends. The chief advantage—better voice quality—results from PACS's use of 64 kbps coding versus IS-54/IS-136's 8 kbps.

"You're much closer to wireline with PACS than with IS-54," Jewell says.

PACS also offers higher data rate, as well as significantly greater channel capacity—the latter of special interest to carriers.

Jewell suggests PACS could function as a complete low-mobility solution, or in a hybrid system in which IS-54/IS-136 provides high mobility.

Though PACS could be part of a broad-based system, such a network would require dualmode PACS/IS-136 phones. "I think it becomes difficult to work PACS into a rural area," Jewell concedes.

However, PACS's strength will be in campus and in-building systems. "PACS is probably one of the best solutions for that," Jewell says. Besides these technical advantages, PACS can operate in either licensed or unlicensed PCS spectrum, he points out.

HIGH MOBILITY

But a leading TDMA service provider stands firmly behind IS-136. McCaw Cellular looked at PACS but determined high mobility was crucial to its PCS plans, according to Rod Nelson, vice president-engineering.

Though he concedes PACS "may offer some margin of better [voice] quality," Nelson insists new 8 kbps voice coding technology will improve IS-136's voice quality.

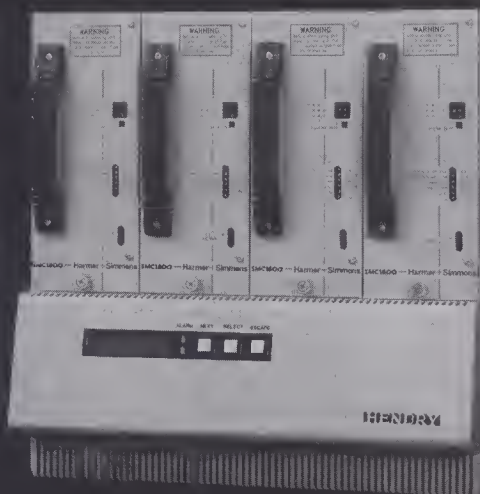
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Circle 116

"That quality differential is going to be narrowed down," he promises.

McCaw determined IS-136 could serve its low-mobility needs as well as PACS, Nelson adds.

"The service need is there, but we haven't been able to identify why you'd need two standards to realize that," he says.

LOCAL LOOPS

But PACS could succeed in wireless local loop applications. SBC is conducting a "blind trial" with 15 to 25 employees in St. Louis County. Homes are linked to the network by both the copper drop and PACS radio port (RP), but participants don't know which is serving them at any given moment, explains Dave Wolter, member-technical staff for Southwestern Bell Technical Resources' wireless communication division.

SBC is "talking about" mobile trials for PACS, but has made no decisions, Wolter adds.

For the local loop, each neighborhood RP has a 1000-foot radius, he explains. The trial uses five RPs. Wolter believes each RP will support about 35 users but expects the trial to yield a more definite figure.

"Part of what we're trying to figure out is, what is that capacity?" Wolter says.

RPs link to radio port control units, which in turn have a TR303 interface with the central office switch, according to Wolter. A network element manager controlling the radio system interfaces with the central office operational support systems.

SBC hopes the trial will generate information helpful in deploying wireless local loops: where and how they're most cost effective, whether to deploy all-wireless local loops or hybrid wireless/wireline. Cost could be a major incentive for local carriers to go with wireless local loops, Wolter says.

From the outset, Bellcore engineered PACS to provide local-loop solutions, according to Jewell. Besides near-wireline voice quality, PACS can handle PC data communications and fax machines, as well as a full slate of intelligent network services such as call forwarding, three-way calling, call waiting and call screening. SBC, however, is trialing only POTS in St. Louis County, Wolter says.

Bellcore continues to experiment with



DENSE LOCATION - Campuses, in-building sites and urban areas such as Manhattan are the likeliest mobile applications for PACS, Bellcore's TDMA standard.

higher-mobility PACS implementations, most recently testing service that can support 65 mph travel with handoff. But Bellcore isn't saying PACS must go head-to-head with IS-136 in order to find its niche.

"It has a market strictly as a low-mobil-

ity standard," Jewell says, though he adds a high-mobility component only can strengthen the case for PACS.

"It's not a given that only one [TDMA standard] can survive," Jewell says, "but a lot's going to depend on what service providers define as their target." ■

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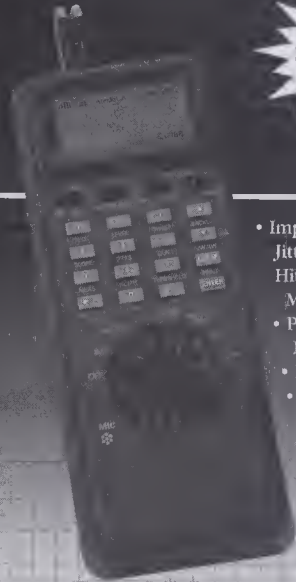
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WAVELET TECHNOLOGY PROMISES ADVANCES

Aware Inc. keeps pace in the bandwidth race, and future developments could make ADSL a top contender in providing hicap services.

Mark Dziaikiewicz
Technology Editor

Seems like *deja vu*, but ADSL could become interactive technology's next hot transmission topic. At least that's the hope of Aware Inc., a mathematical engineering company providing broadband bandwidth-management solutions for copper- and coax-based transmission systems.

Aware's WaveTel system design and software, based on the company's pioneering discrete wavelet multitone (DWMT) modulation technology, will be embedded

in Analog Devices chips. The product increases bandwidth efficiency and noise immunity, providing higher data rate throughput. Chip sets for 6 Mbps downstream/640 kbps upstream transmission are being introduced this month, and transceivers are slated for trial in the fourth quarter.

Aware and Analog Devices have allied with Westell, Newbridge Networks, AT&T Network Systems and NEC Australia.

The future is even more promising, thanks to Aware's "VDSL" or very high-speed ADSL technology, which transmits

on copper loops at 25 Mbps and 50 Mbps rates.

"ADSL's limit is 18,000 feet," notes Chris Batts, Aware regional sales manager. "Using [WaveTel ADSL] technology, you could get 25 Mbps downstream, but it reduces the distance to 3000 feet." Transmitting at 50 Mbps limits distances to 1000 feet, but either rate could serve RBOCs' fiber-to-the-node/curb designs.

A wavelet-based variation, Aware's WaveTel ADSL replaces standards-based ADSL's DMT discrete Fourier transform with discrete wavelet transform. Aware contends wavelet transform provides better channel isolation between subchannels than Fourier.

"We feel our wavelet technology can be deployed in hybrid coax networks or with digital video where they have to make the final hop on copper or coax," Batts adds. "It can isolate ingress noise, which is particularly important in hybrid fiber/coax networks."

MODULATION METHODS

DWMT and DMT are multicarrier modulation methods, taking time division multiplexed (TDM) data and transforming it to frequency division multiplexed (FDM) data. By partitioning transmission bandwidth into subchannels, multicarrier modulation provides an efficient means to access multiple multiplexed data streams. It also provides an effective means for combating narrowband interference. When a subchannel is too noisy, DWMT does not use it, thereby avoiding channel impairments and maintaining a reliable high-bit-rate throughput.

Batts sees RBOCs taking renewed interest in ADSL or the proprietary WaveTel ADSL. "They seem to be revising technical issues on video dialtone," he explains. "U S West looked at ADSL two years ago and moved on. We think they'll be pushing fiber farther into the neighborhood, so it could still play into their plans."

Many of ADSL's problems stemmed from undelivered vendor promises, a situation Aware doesn't see happening again. "A lot of promises made by vendors weren't met," he continues. "Ultimately, buyers said, 'It's too late, we're moving on.' They were driven by fear of lost revenues—a fear that companies were going to come in and steal their market."

Handled properly, ADSL could translate into a major telco advantage because

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it's based on something of local abundance—copper loops. "People have said it's a transition technology, but transition could be anywhere from five to 15 years worldwide," says Batts. "If every manufacturer started to produce fiber, they couldn't manufacture enough fiber to wire the U.S. for 15 years. What is there a lot of? Copper! ADSL equipment is reusable. If you drive fiber into the neighborhood, you can take out the equipment and move it to a new neighborhood."

INTERNATIONAL EFFORTS

Outside the U.S., telephone companies see ADSL's potential. "Europe seems much keener on ADSL," he claims. "They have a lot less cable penetration. They look at the same data as [U.S.] telcos and CAPs and come up with different conclusions."

Aware plans to stimulate local interest with a trial demonstrating high-speed Internet access. "We're talking to telcos and large CAPs about a trial," he explains. "What we're proposing to do is bring together a team of content providers, somebody that owns copper and an Internet access provider. We want to get people focused on applications. We're going to build a pilot access network and show people ADSL is real, available and high performance."

Performance will be key. The telcos' sole high-speed access offering seems to be ISDN. Compared to analog modem access at 14.4 kbps and even 28.8 kbps, ISDN provides significant improvement. But looking at cable modem access at minimum speeds of 500 kbps, ISDN loses its appeal. And considering startup costs and ordering difficulty, ISDN looks more like transition technology that never may transition.

ADSL, on the other hand, increases access rate capability and takes advantage of existing infrastructure. "People want Internet access, but the problem is it's painfully slow and not everyone is going to put a T1 line in their home," Batts continues. "ADSL preserves POTS, unlike ISDN. And it transports ATM and TCP/IP. It's a physical layer protocol. We're concerned with the media and not the layers above."

As carriers rethink broadband distribution plans and delivering the right content at the right price, ADSL likely will get a second chance. And Aware Inc. believes results will be different the second time around. ■

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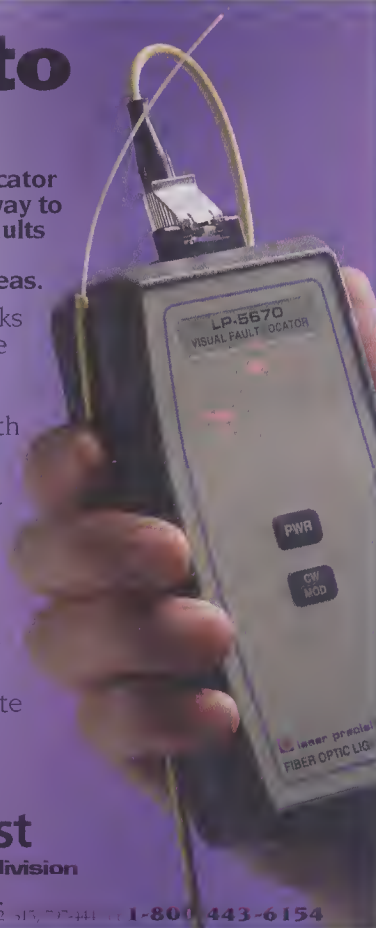
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Circle 123

LOW-COST SUBSTITUTE CROPS UP FOR SONET

A less expensive distribution system can bring fiber's benefits to rural serving areas.

Mark Dziatkiewicz
Technology Editor

Providing Sonet's flexibility without inflated costs is E/O Networks' mission in serving rural telephone markets. And its FDS-1 Fiber Distribution System even may play in Peoria.

Meeting rural distribution needs calls for special consideration and design. And that's why Sonet's "one size fits all" standards approach falls short in rural markets—the numbers don't add up.

"I don't think Sonet's a big issue for this part of the network," says Leif Hoglund, vice president-marketing for E/O Networks. "Some vendors are trying to

make it important. But customers are looking for something that's low cost and reliable. Sonet at the present time isn't practical."

Long local loops and small subscriber counts are rural market mainstays. E/O's FDS-1 is designed with those parameters in mind.

"Many of the routes are quite long—125 miles is typical," he continues. "If you want to go to optical fiber, the cost of that fiber becomes a major part of the cost. But if you can put up to 30 optical nodes in a ring, the cost of the fiber becomes much less so from a total project perspective."

Rings are key to the FDS-1 design. It uses a counter-rotating ring architecture to

provide the full spectrum of telephone services at copper costs.

And when operating in the bidirectional path-switched mode, FDS-1 provides full transport protection. "In rural applications, if you had a cable cut due to a plow, there's no loss of service because each optical node receives its signals from two directions," explains Hoglund. "That means you don't have to send someone out immediately for maintenance. And for small telcos, something like a cable cut can take all day because it takes a half-day to get there."

FDS-1 connects a central office switch with as many as 30 ONUs spaced to distances of 75 miles. ONUs are available with capacities of 16 to 96 lines, supporting carrier serving areas as long as 12,000 feet. FDS-1 operates on fiber, copper or radio links via a DS1 or E1 interface. Services provided include POTS, specials, ISDN, data and DS1.

"Smaller telcos are concerned about the same things that urban business users are concerned about," he adds. "We can take off any bandwidth we need at any ONU. We have a natural ring like a local area network and have the ability to set up a

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LAN. We could offer packet-switched service to the house."

But even without its new service potential, FDS-1 provides basic telephone service at cost effective prices, according to Hoglund.

"Most telephone companies don't even want to think about future services. They have enough to worry about to keep service up," he says. "They're looking at the product to provide low-cost telephone service."

ONUs function like digital loop carrier remote terminals. "The network consists of a lot of points from which service can be provided," he explains. "We connect to a switch, and all our optical nodes are remote terminals, just like DLC. Fiber is shared amongst many of them, and they are a lot smaller than what you normally see."

"Our product is designed for less than 100 subscribers. It's much more effective than products designed to serve a number of customers."

But FDS-1 moves beyond basic telephone service; it delivers broadband ser-



DAIRY TO BE DIFFERENT - E/O is providing a way to get fiber to rural areas without the expense of Sanet.

vices using AM fiber transmission to optical receivers located at each ONU. The broadband option can be implemented initially or added as market demands.

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transmitted to subscribers, regardless of format.

"We can provide service from any ONU on coax," Hoglund maintains. "Additional fibers are used so we don't attempt to mix the voice and video. The same ONU [housing] handles the video, but the electronics aren't shared."

FDS-1 completed field testing with Brookings Telephone in South Dakota. The trial continues for an additional three months to obtain Rural Utility Services (RUS) approval.

"If a product meets their performance specifications, they then list those products and companies can borrow money to buy them," he explains. "It has become very important to the small telephone industry to be listed. They're seen as providing the standardization process."

With more than 8 million U.S. lines fitting E/O Networks' low-density rural profile, FDS-1 can meet small-market needs with urban market capability. Who knows—it might even end up playing in Peoria.

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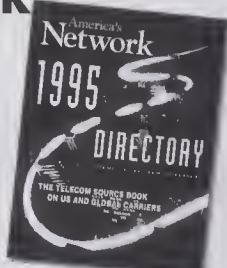
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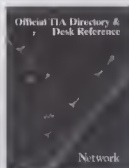
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COPPER GETS WIRED

Mark Dziatkiewicz
Technology Editor

As ATM makes its way to the desktop, Tut Systems deserves credit for its enabling technology contributions. Its newest products incorporate Tut's Fast Copper Technology, enabling 155 Mbps ATM transmission rates on Category 3 UTP (unshielded twisted pair) copper wire.

Though customer premises-based, the products are significant because they allow ATM on Category 3 wire—the majority of customer premises wiring—potentially accelerating public network ATM service acceptance and growth. "The unique thing is we run on Category 3," says Sal D'Auria, Tut Systems CEO and president. "No one I know claims they work on Category 3." Avoiding costly wiring installations makes for an attractive network upgrade alternative.



TUT CEO - Sal D'Auria helps bring ATM to the desktop.

"If you're connected with Ethernet on wire, you're likely on Category 3 wire," he continues. "If you wanted to put in a 155 Mbps system, the vendors would tell you to string new fiber optic cable or put in a higher grade of wire [Category 5]. We reduce the cost of ownership by taking away the requirement to run fiber [or new copper] and just use the wire you've got."

Tut's 155 Fiber to Copper Converter and 155 PMD (physical media dependent) Transceiver connect end users to ATM private network switches and components. The 155 Copper Converter is a media converter connecting ATM fiber optic switch ports to existing inside wiring. It eliminates installation of additional UTP wire or fiber

to connect desktops to a fiber optic network. Customers can use or buy switches with optical outputs and avoid upgrading wiring. "If you're using a switch that has fiber optic output, the converter takes care of the permutations," explains D'Auria.

The 155 PMD Transceiver is an ATM Forum-compliant module to ease design migration from fiber products to Category 3 and 5 UTP. It's used either on the network interface card side and/or the switch. "It's footprint compatible—electrically pin-for-pin compatible—with fiber optic transceiver products used in the industry. From an OEM perspective, we want to make it easy so they can drop one in place of the optical component. Vendors that might use this don't need to change the board, they just change a part on the bill of materials."

Tut uses the same technology for ATM to the desktop as in its residential broadband products (*America's Network*, Jan. 15). "We're trying to remove the barriers for people implementing ATM at the desktop," he says. "Some day, ATM's going to come into your home. And it's more bandwidth on ordinary wire than people thought possible. But it will only come to be if people like us provide these kinds of technologies." ■

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Sept. 6-8	NTCA Finance and Accounting Conference	San Antonio TX	Marriott Riverwalk	202-298-2351
Sept. 10-12	Ohio Telephone Association 100th Annual Meeting	Columbus OH	Hyatt on Capitol Square	614-221-3231
Sept. 10-13	America's Carrier Telecom Association (ACTA)	Hilton Head SC	Hyatt Regency	407-695-7919
Sept. 10-13	Rural Communications Beyond the Year 2000	Coeur d'Alene ID	Coeur d'Alene Resort	707-538-7755
Sept. 10-14	CBTA Telecommunications Conference	Vancouver BC	Conference Center	416-865-9993
Sept. 11-12	Re-engineering Billing Systems in the Telecommunications Industry	Chicago IL	The Westin Hotel D'Hore	201-256-0211
Sept. 11-13	Telephone Association of Michigan Annual Meeting	Thampsanville MI	Crystal Mountain Resort	517-482-4166
Sept. 11-13	West Virginia Telephone Association Annual Convention	Wheeling WV	Oglebay Park	304-684-1191
Sept. 11-15	Wireless Technology Conference and Exposition	Stamford CT	Stamford Sheraton	407-878-8200
Sept. 12-13	Sa... You want to be a local telephone company?	Atlanta, GA	Ritz Carlton Buckhead	202-466-2581
Sept. 12-14	Networks Expa Dallas	Dallas TX	Convention Center	800-829-3976
Sept. 12-14	TeleCon '95	Vancouver BC	Trade and Convention Center	416-252-7791
Sept. 13-14	VOICE Mexico '95	Mexico City, Mexico	Hotel Presidente	800-331-5706
Sept. 14-15	Cellular Telecommunications Fraud Prevention Summit	Chicago IL	Tremont Hotel	312-419-6127
Sept. 14-15	Power & Communications Contractors Mid-Year	Williamsburg VA	Williamsburg Lodge	703-823-1555
Sept. 14-15	Wireless Business Telephone Systems Seminar	San Francisco CA	Marriott Hotel SFO Airport	800-948-8225
Sept. 17-21	Tele-Communications Association (TCA) Conference	San Diego CA	Convention Center/Marriott	909-945-1122
Sept. 18-20	Telco-Cable VII	Washington DC	Loews L'enfant Plaza Hotel	800-822-6338
Sept. 19-21	UNIX Expa	New York NY	Jovits Convention Center	800-829-3976
Sept. 20-21	Advanced Intelligent Network: What Lies Ahead?	Washington DC	National Press Club	202-434-8822
Sept. 21-23	Personal Communications Showcase '95	Drlonda FL	Drange County Convention Center	800-416-5521
▼ Sept. 23-26	Alaska Telephone Association Associate Member Showcase and Trade Show	Anchorage, AK	Anchorage Hilton	907-563-4000
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Oct. 10-12	Consumer Electronics Show (CES) Mexico	Mexico City, Mexico	Palacia De Las Deportes	703-907-7600
Oct. 10-12	Mid-American Cable Show	Overland KS	Overland Park Marriott/Trade Center	913-841-9241
▼ Oct. 15-18	National Communications Forum (NCF95)	Rosemont IL	Hyatt Regency D'Hore	312-938-3500
Oct. 16-18	Newport Conference on Fiberoptics Markets	Newport RI	Newport Marriott	401-849-6771
Oct. 18-20	International Wireless Communications Expa (IWCE)	Tampa FL	Convention Center	800-828-0420
▼ Oct. 22-24	Mid America Telecom Show and Seminar	Kansas City MO	Hyatt Regency	913-234-0307
Oct. 23-24	Wireless Data Networks	Chicago IL	Tremont Hotel	312-540-3856
Oct. 23-24	Wireless Business Telephone Systems Seminar	Minneapolis MN	Minneapolis Marriott	602-948-8225
▼ Oct. 23-25	Midwest Regional Telecommunications Expa (IN, DH, MI)	Fort Wayne IN	Grand Wayne Center	317-635-1272
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Oct. 25-27	TeleConferencing Users Conference	Anaheim CA	Anaheim Convention Center	405-743-0320
Oct. 29-Nov. 1	Intelc '95	The Hague, Netherlands	Congress Center	908-221-0013
Oct. 30-Nov. 1	Reengineering the Telecom Back Office	Washington D.C.	Visto Hotel	800-822-6338
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▼ Nov. 5-8	USTA National Conference	Drlonda FL	Marriott/Hilton	202-326-7279
Nov. 6-9	Next Generation Networks Annual Conference	Washington D.C.	Crystal Gateway Marriott	800-227-1234
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Nov. 11-13	NIUF (ISDN) Fall Meeting	Gaithersburg MD	National Institute of Standards & Technology	301-975-2937
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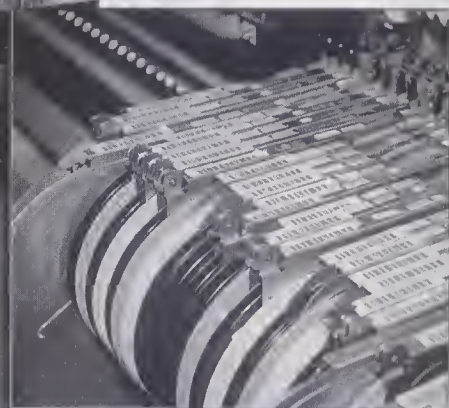
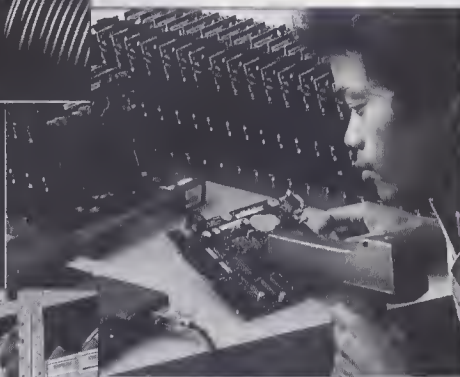
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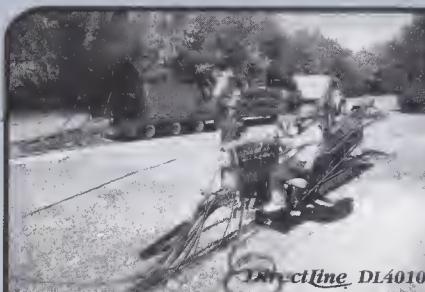
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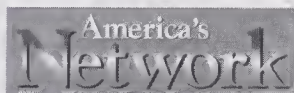
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THE PARTY

L I N E



CREATING MORE ACCESS, MORE MINUTES, MORE MOOLA

Art Brothers

It took me two years to figure out how to file our FCC access tariffs. In less than 12 pages. Like it's not a secret, but the IXC's nearly came unglued at being informed Beehive's revenue requirements to terminate their toll was 46 cents per minute.

MCI has been the only holdout. That's OK. We concur with NECA tariffs that allow MCI to pay just over 10% interest on the 700k they owe.

It's not like they don't have the moola. So one of these days, they'll get around to paying like everyone else. A few of the little Mom and Pop IXCs have re-routed their traffic destined to our 15 exchanges to other IXCs. I'm told they will let the guys with more money get the bills.

Any other complaints? Sure.

Led by AT&T—most everyone. Folks question how they can earn any money calling into the Beehive system. I tell them it's called "averaging." Howsumever, we got so much traffic since going on "access" in July of '94, we had to ask the FCC to let us re-file lower rates as of July of this year. That combined with the "data request" just about did us in.

EDUCATIONAL TV AND FIBER

In NW Utah, I went from open wire to buried fiber optic in one jump. After U S West gives its toll to my tandem, some toll can ride 145 miles on fiber to get to 44 customers in Park Valley.

Grouse Creek is halfway in between with 45 telephones. Each of these communities has a school that goes from K to 10.

Each school has about 40 kids spread over those 11 grades. This year, they get compressed two-way video over a T1 to each school. The programming is run from a college in Logan. With typical settlements, the schools would have to pay up to perhaps two-thirds of the cost of that 145 miles of fiber.

But that's not the way it works. In reality, we only charge enough to cover the specific drop and multiplex additions for the schools, and none of the toll route revenue requirement. Let's face it, the toll system expense got spent just for message toll and 911. Our state and LATA toll facility revenue requirements are met by state toll tariffs.

So, the rationale is that for the few grand more it costs to get ETV into the schools, we are more than happy to do it for the good of the rural kids. As the little hometown telephone company who knows every one of our customers by name, it is our civic responsibility to get ETV to the schools at the least possible cost. It is a win-win situation.

MINUTES OF USE

For 10 years, I've been plotting and thinking how to get more minutes. One was to do our own operators. The Utah PSC went along and authorized Beehive to establish its own operator center. I used Protocall's first model A system.

It allowed me to get my feet wet and learn. Having a minimum security prison helped. Fact is, the revenue from inmate calling generated more than half my Nevada company revenue.

It was a big-time subsidy for what is now a three-exchange system with 99 telephones spread along 100 miles of I-80 from Elko to the Utah border. By using 800 access numbers and good marketing, it is possible to generate a lot of operator revenue.

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From there the customer can go to an operator or access their PIN (jes' lak a credit card), which allows them to then out-dial from your system.

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It's cheaper than hiring an operator. For a while, we routed 0+ calls to the home of an employee who got paid for doing the night work. Small telco operators are exempt from wage and hour laws, so you won't get stuck with the 40-hour week deal.

Next month I'll tell you how I multiplied terminating minutes 20X. ■

Win-Win Situation

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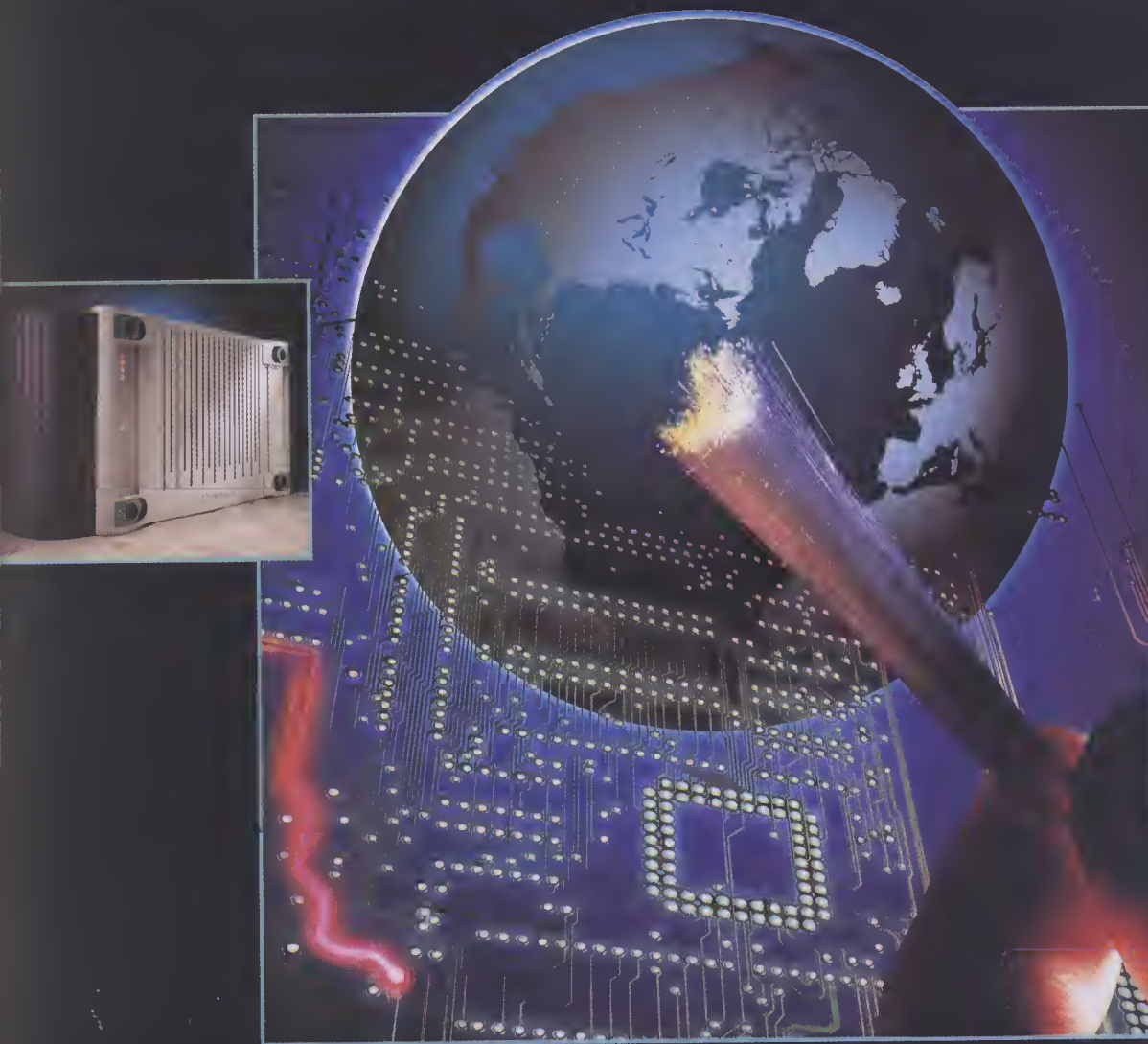
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Any OSIRIS service can be provisioned remotely in seconds using its unique graphical provisioning system, allowing OSIRIS networks to grow to meet your customers' changing needs... right when they need it.

Positron's OSIRIS has the lowest space holding requirements of any product in the industry and provides features such as path-protected rings and time slot assignment as standard (*rather than expensive add-ons*), providing all the features you need for broadband access in one compact, modular package.

So, when you are planning broadband fiber access networks, Positron OSIRIS opens up a world of new opportunities!

**For more information, call: 1-514-345-2200
1-800-443-3313**



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